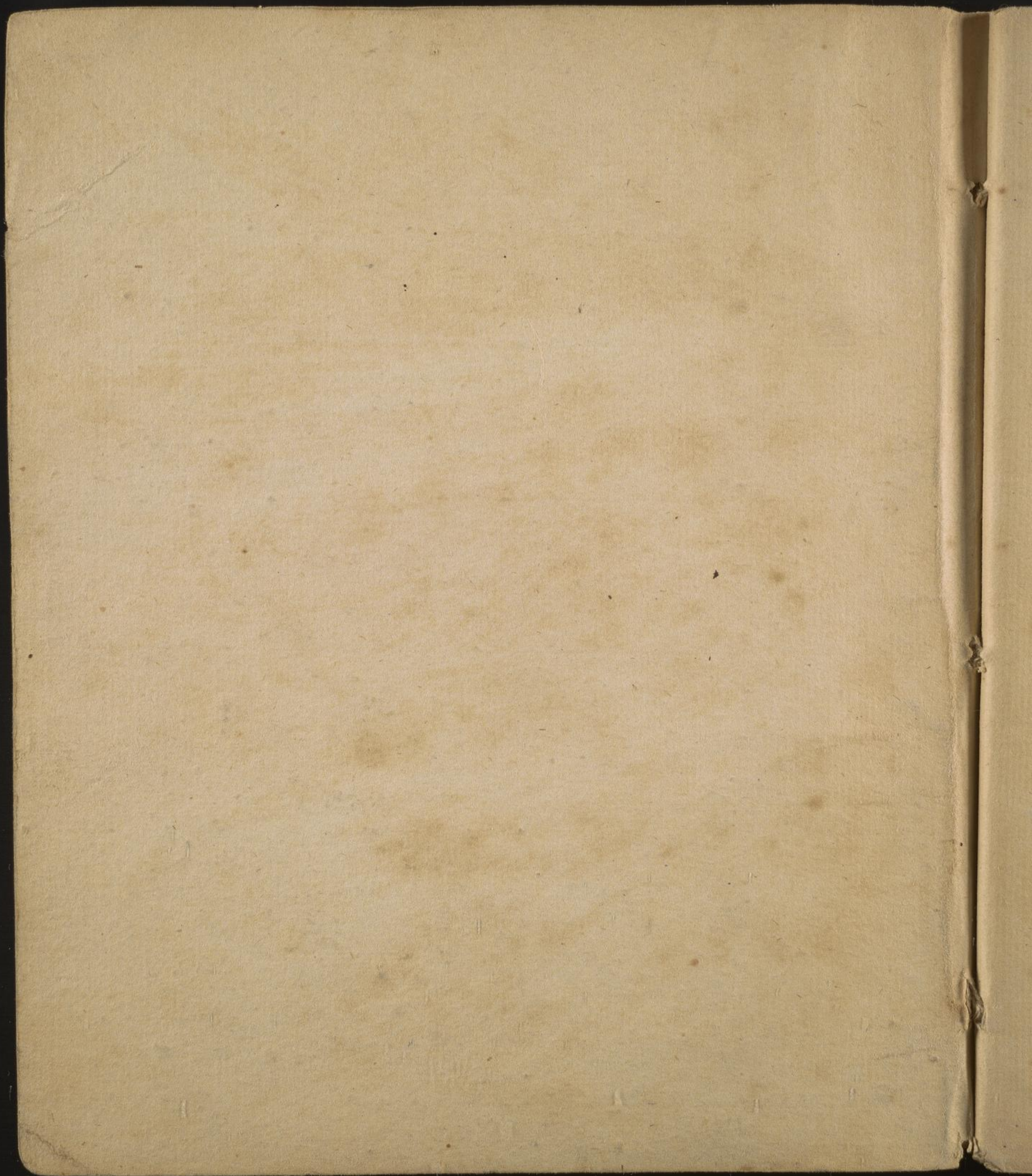


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16



of Digestion 621.
of the Chyle — 652.
of the blood —

V I shall first remark that the
Stomach is a most important viscus,
hence it is possessed by all animals.
It is so full of nerves that it may be com-
pared to a tremendous expansion of the brain. So
essential are its functions to life, that
it has said the soul is seated in it. It is
certainly the index of the state of the
system in many diseases. ~~It possesses~~
~~Stomach~~ ^{Association in health of sympathy in sickness} a wonderful connection with
every part of the body: in health as
well as in sickness - The nerves and
blood vessels may even the mind are
affected by it. ^{It is one of the waste gates of excess} - hence it should never
^{be given impressions} be lost sight of in a moment in inquiry
in investigating, & prescribing for diseases
of those parts. In many diseases it is said
enter the body thro' the medium of the

such parts of the mouth as to favour
 the action of the teeth upon it. It after-
 -wards protrudes it into the fauces from
 whence it passes by the tonsils - Velum
 palati - & Epiglottis assisted by the action
 of a great number of small muscles
 into the Oesophagus - and from thence
 into the Stomach where it undergoes
 the process of digestion. ^{Solids} ~~Things~~ more easily
 swallowed than fluids.

Of Digestion.

~~Question~~ In what manner is this
 performed? - The answer to this
 Question shall be the business of
 our ^{inquiry.}
~~the present lecture~~ V

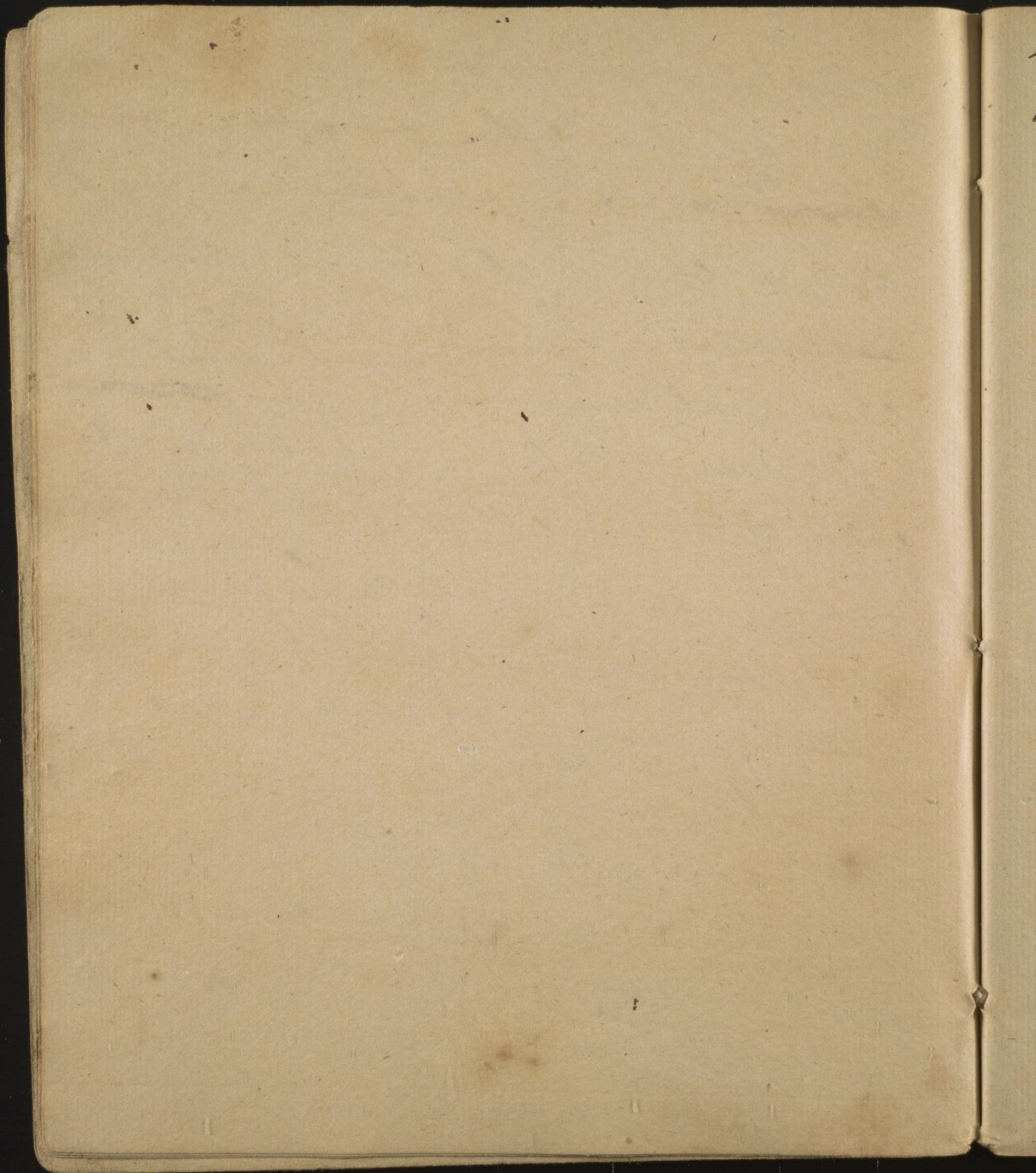
// The changes which the food
 undergoes in the Stomach previously

Stomach — Still more I believe are
expelled from the body which act
primarily, & exclusively upon it. —
~~But to return~~ —

It is formed ~~as~~ like the teeth upon the
compound principles of carnivorous
& granivorous animals.

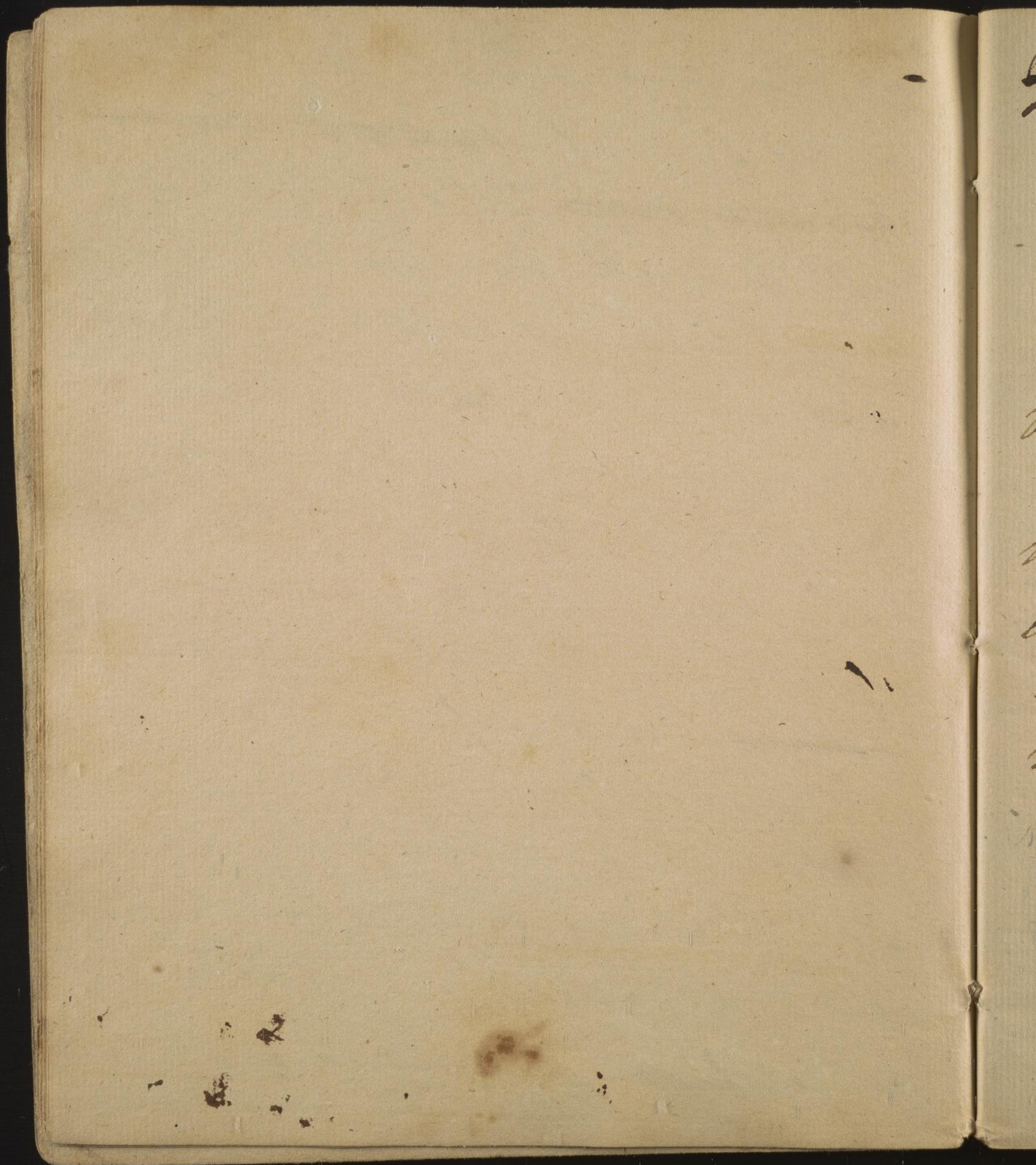
Its function is an important one
in the animal Economy. ~~The~~ ^{We behold} ~~the~~
in ^{it} something like what the Alchemists
have sought for in their crucibles — in
their attempts to obtain Gold from the
baser metals — a power of changing the
most dissimilar & heterogeneous matters
into a ~~more~~ substance which imparts
nourishment & life to the human
body. —

to its living converted into Chyle, has
 been ascribed to the operation of two
~~agents~~ agents. These are 1 mechanical
 and 2 chemical. The mechanical
~~includes~~ includes Trituration only. The
 chemical includes ^{putrefaction} - heat - ~~putrefaction~~
Solution - and fermentation. Of
 each of which I shall treat in order.
 Much was ascribed to Trituration
 by the mechanical physicians. Pit-
 -river has computed the force of the
 employed in digestion
 Stomach, to be equal to 12,951 pounds.
 Dr Boerhaave has enumerated all the
 forces which are supposed to act in
 digestion - These are the muscular action
 of the stomach - the action of the
 Diaphragm in respiration - and



even

the constant pulsation of the Aorta ^{can}
 on the Stomach. ~~But nothing could~~
~~be done for it~~ Dr Pitcairns's calculation
 of the force of the Stomach was not
 deemed to be contradicted, and the forces
~~of the~~ enumerated, ~~to~~ Dr Burhaane, ~~and~~
 will appear to be very trifling from
 the history of the following exp^t made
 by Spalanzani. He swallowed 25
 whole grapes - and discharged 18 of them
 in an
~~without~~ unbroken state. He swallowed
 many whole cherries afterwards, most
 of which he discharged in the same
 sound state in which he took them.
 The triturating force of the stomach
 must be small indeed not to



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~~have~~ destroyed the texture of those tender
fruits. We proceed next to inquire into
the chemical Agents which have been
supposed to be employed in Digestion.

~~But~~ I reject putrefaction altogether
from having any agency in Digestion.
On the contrary - the putrefaction of
the Aliment unfits it so much for
being converted into Chyle - that when
Aliment which partakes of a putrid
Nature is received into the stomach, it
always sweetens by the action of the
gastric juice upon it. —

The ~~only~~ ^{other} agents which are
concerned in Digestion, I suppose
to be, Heat & Solution. ~~It is to be mentioned~~
hereafter.

E. n. : of olden

Spallanzani has determined this
by an accurate exp^t - he exposed a
cubed with some flesh to a heat =
to $\frac{1}{4}$ of $\frac{1}{4}$ human body - & the same
quantity to a heat of the common
air which was probably 20th degrees
below it. The first putrefied in 12 hours -
the last - in 2 or 3 days.

Mr Hunter found that the digestion
of a frog which went on at ~~60~~ 60th was
effectually checked ~~when it fell~~
It is from the influence
to 35th or 40th. ~~The~~
of heat ^{in part} that digestion goes forward
more rapidly in warm blooded, than
cold blooded animals. Eg Dog. & viper.

Heat is essential to digestion. The polypus
 employs 2 or 3 days in winter in dig-
 -ting that food which it digests in 12
 hours in summer. ~~no solution~~
~~no solution~~ can take place ^{the} without

it. The gastric juice which is the
 principal solvent of the aliment in
 the stomach dissolves ~~no more~~
 dissolving power ~~at~~ in a heat of 44° or
 even 48° than common water. It is
 more active in a heat of 79° but its
 dissolving power is greatest at 112° . ✓

Heat is likewise essential to fermentation,
 and no degree is more favorable to
 an active and perfect fermentation
 than the heat of the human body. ✓

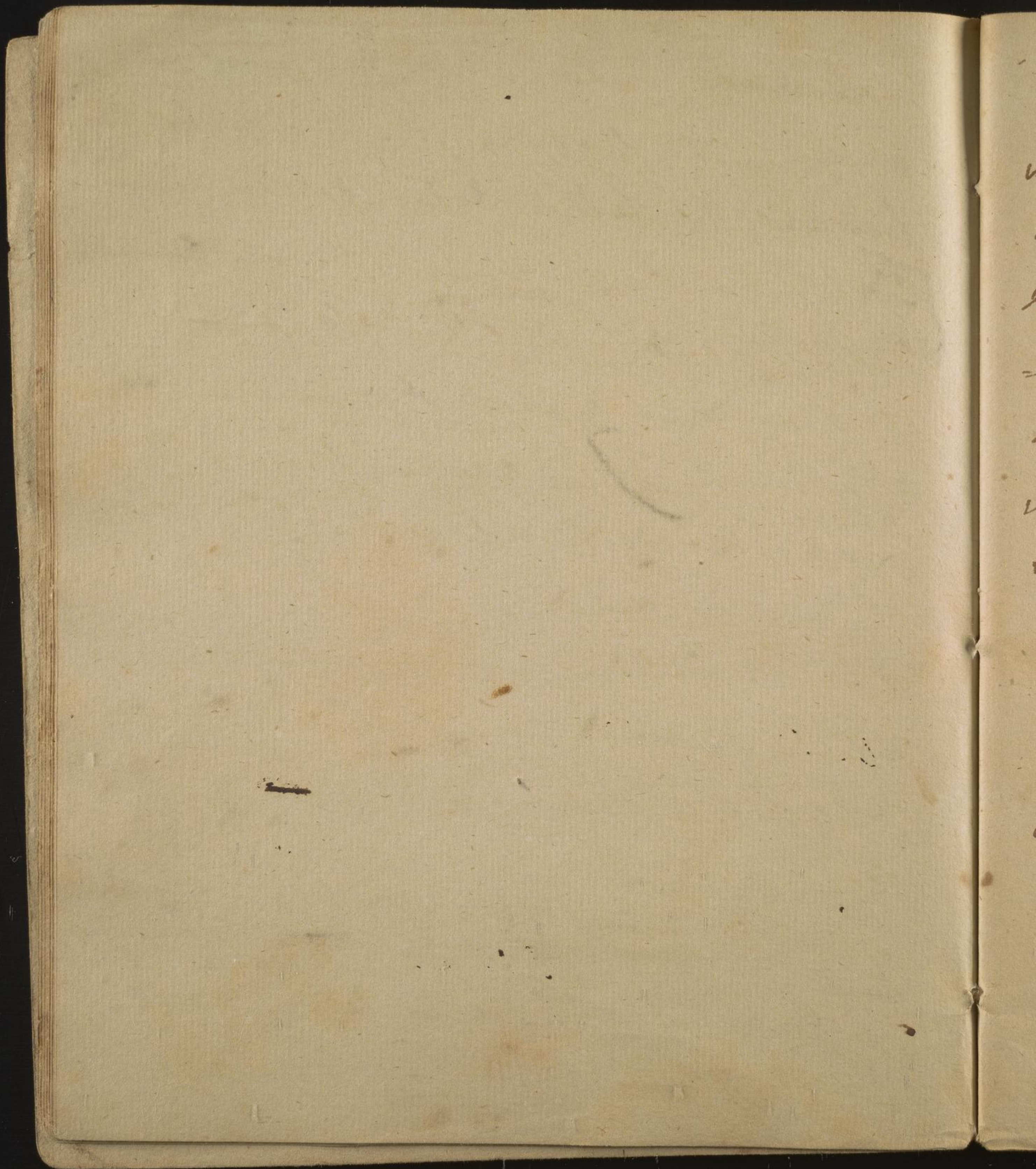
v The dissolving power of the saliva has ¹²³
been established by ~~many~~ ^{many} experiments. ~~344~~ ³⁴⁴

~~one~~ of it are secreted in the course of
24 hours. It serves the further ^{purpose} it is
supposed of Absorbing ~~Oxygen~~ which
it conveys into the body. It has
neither taste, nor smell, and hence
~~it~~ it never impairs in its healthy
state either ~~the~~ of the powers of taste or
smell.

Solution is likewise essential to digestion. The liquors which dissolve the food, are the Saliva, & the Gastric juice.

To decide the dispute between ~~Dr. Haller~~ ~~Dr. Mead~~ & ~~Dr. Keil~~, I am one of whom asserts that it promotes the other checks of the Gastric Juice is the most active of these liquors. It was not the honor of Spallanzani to have discovered that the Gastric Juice possessed a strong dissolving power over animal & vegetable substances by his experiments.

The same doctrine was established long before the time of Spallanzani. Dr. Haller ~~many~~ ~~years~~ years ago. This gastric juice acts more or less in all animals, but more in some of



them than others. — These Animals
 which have gizzards stand in the least
 need of it — for they divide the food in
 such a powerful manner that it after-
 wards requires but little solution in
 the stomach. Its dissolving power is
 very great in the human stomach, hence
 we find cartilages — tendons & even
 bones are dissolved by it as well as
 common flesh. — It is probably more
 abundant and more active in Children
 & in old people than in ~~the~~ middle
 age, in order to supply the defect of
 mastication from the want of teeth.
 It acts most speedily ^{I have said} upon ^{all} food that
 is well masticated, and upon flesh

✓ The presence of nervous influence
is indispensably necessary to Digestion.

By cutting, or tying the 8th pair of
nerves, digestion was destroyed in
a wolf & a dog, in so much that
the contents of the stomach Dr
Haller says become putrid soon
afterwards.

which is perfectly done or well cooked.
 This has fully demonstrated by the exp^t
 of D^r Sturms of St Louis in his thesis
 on digestion. —

This gastric juice has been said by
 J^r Sturms to dispose the stomach after
 death. — It is possible this is sometimes the case
 but I am disposed to ascribe
 what he calls a corrosion of the stomach
~~by~~ by this liquid ^{in some instances} to a destruction of
 substance from inflammation & mortification.

Such appearances are very common
 after death in all the bowels, where
 we are sure the gastric juice cannot
 have ~~any~~ corroding power. ✓

Spadansani says he found diges-
 tion ^{to} go forward after death, but ⁱⁿ ~~not~~
 a very subtle degree after the heat

✓ notice of this kind.

u In addition to these powers, in promoting
digestion, the influence of the ~~whole~~ ^{whole}
~~system~~ system is necessary for this ^{not only}
purpose - hence we find it impaired,
by ^{depressing} passions of the mind, ~~and~~ ^{but} by all those
accidents, and diseases, which divert
~~the nervous influence from it.~~ ^{the nervous influence from it.} ~~in short~~
It is exclusively an animal process as
much so as the formation of blood & semen,
& never less & perhaps never can be
initiated ~~out~~ out of the body. -
go to p. 644. +

+ I beg this fact to be remembered. Abstinence &
low diet, ^{are} founded on it. When we wish for the aid of
all the powers of life in curing a disease, let us ^{leave} ~~let us~~ ^{let us} ~~let us~~
give them nothing to do in digesting a quantity of food, or
food difficult of digestion. ~~Plur.~~ ^{Plur.} ~~grammer.~~

of the dead animal was dissipated. —

The gastric Juice yields by a chemical analysis a large proportion of the animal Ammoniacal Salt — in which is contained the phosphoric or animal acid. Take

^{the stomach} The ~~stomach~~ possessed a power of crushing milk, ^{this is evident in} ~~but it is not so in the stomach~~

of many young animals, particularly children, calves, turkeys & fowls. But

this power resides in ~~the~~ animal

substances as the ~~liver~~ ^{also} ~~and~~ heart of a turkey. It ~~resides~~ ^{is} in fish

~~may reside it resides in the liver of~~

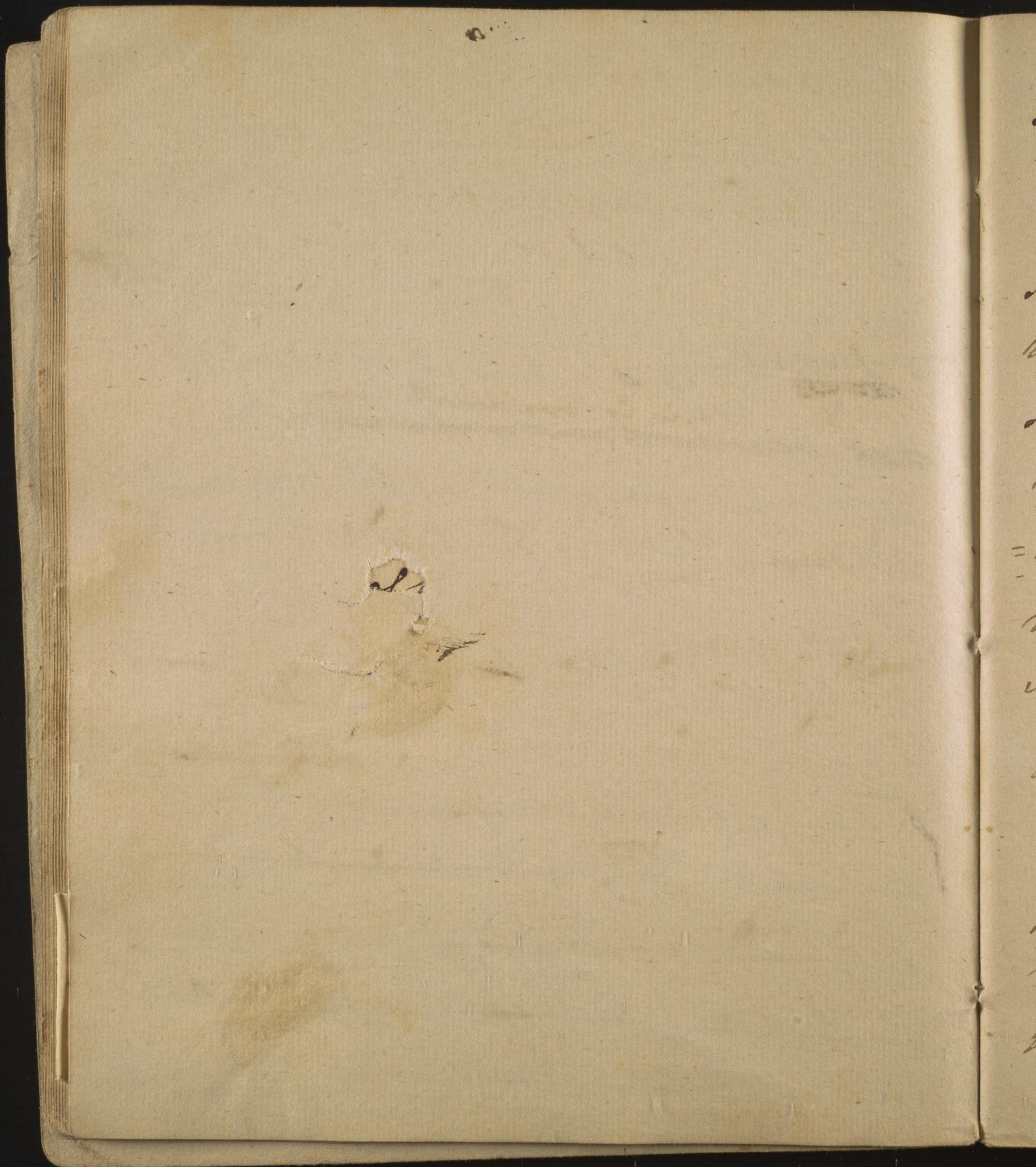
~~the stomach. I must state these facts~~

~~only to deprive myself~~

~~the list list of ~~sup~~~~

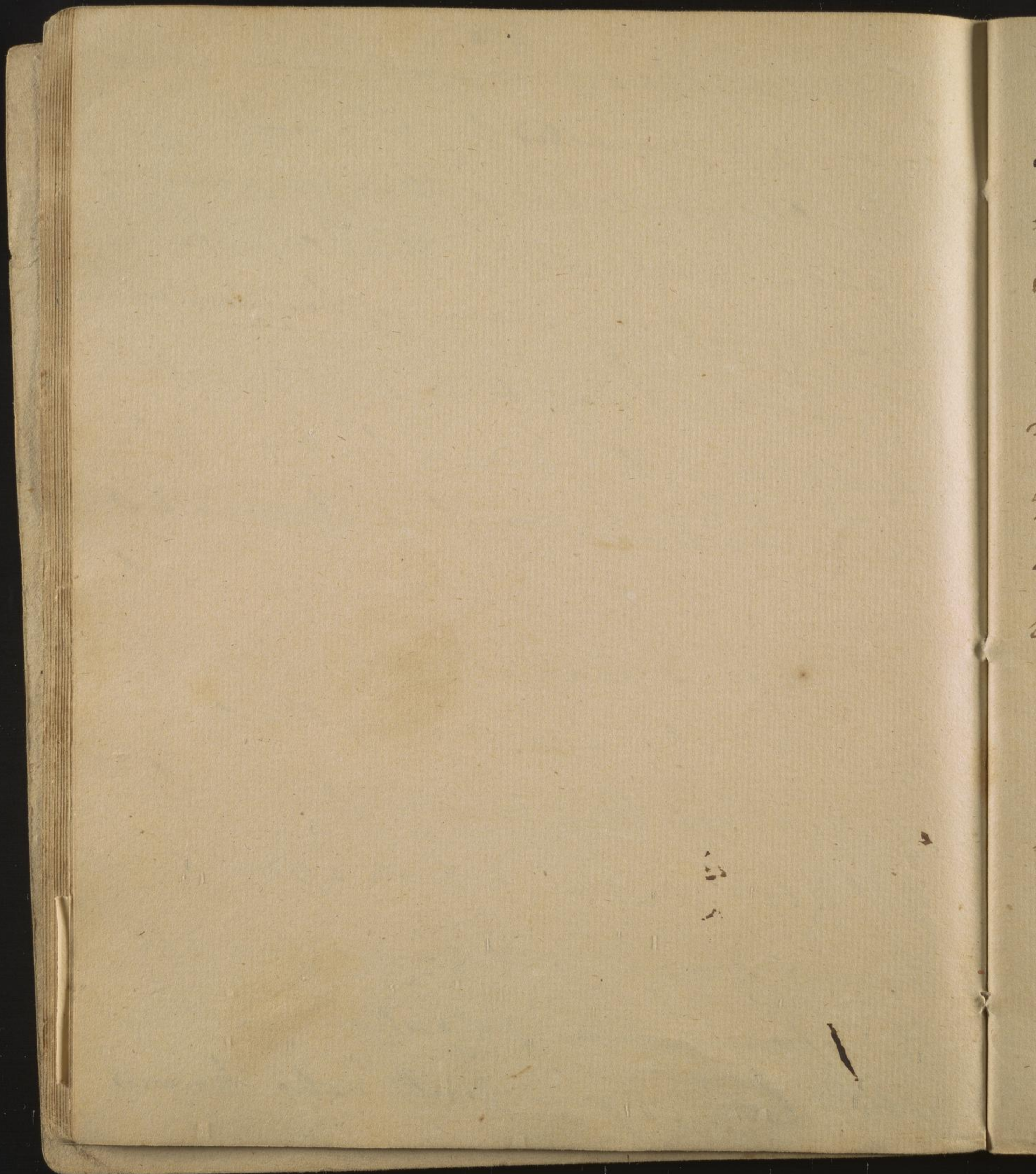
~~present to reside in the~~

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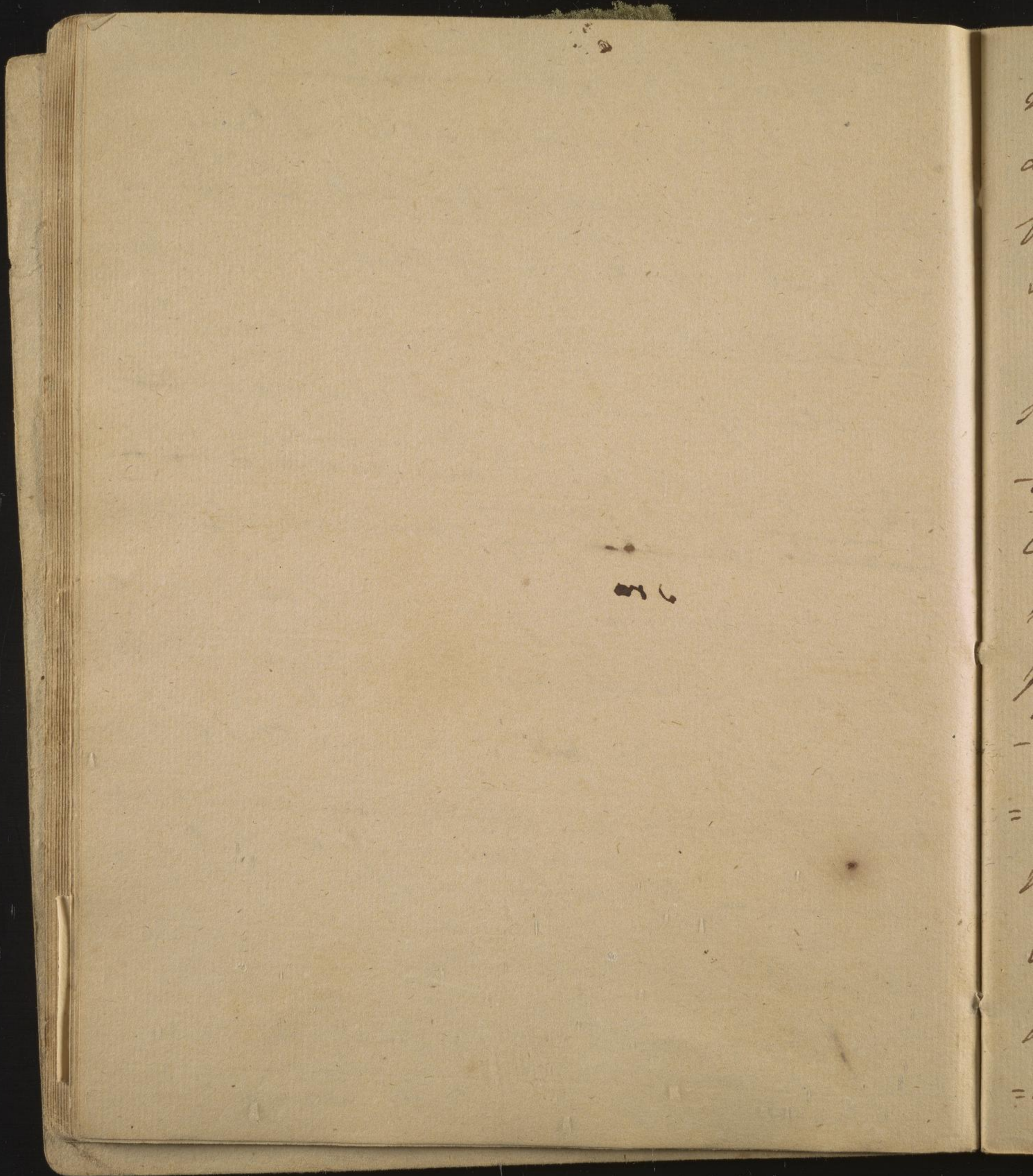
juice, or that fermentation was in a degree promoted by it. —

The Aliment being thus prepared by solution, undergoes a third change in the Stomach by means of Fermentation. I know this process to be in Digestion to be rejected from the modern Systems of Physiology — I know too that there is as much a fashion in Opinions as there is in Drefs. I shall however still defend fermentation as one of the causes of digestion [not because I have like Gil Blas written a book upon it, but because I cannot account for all the phenomena of digestion without it. Such of you Gent. who know



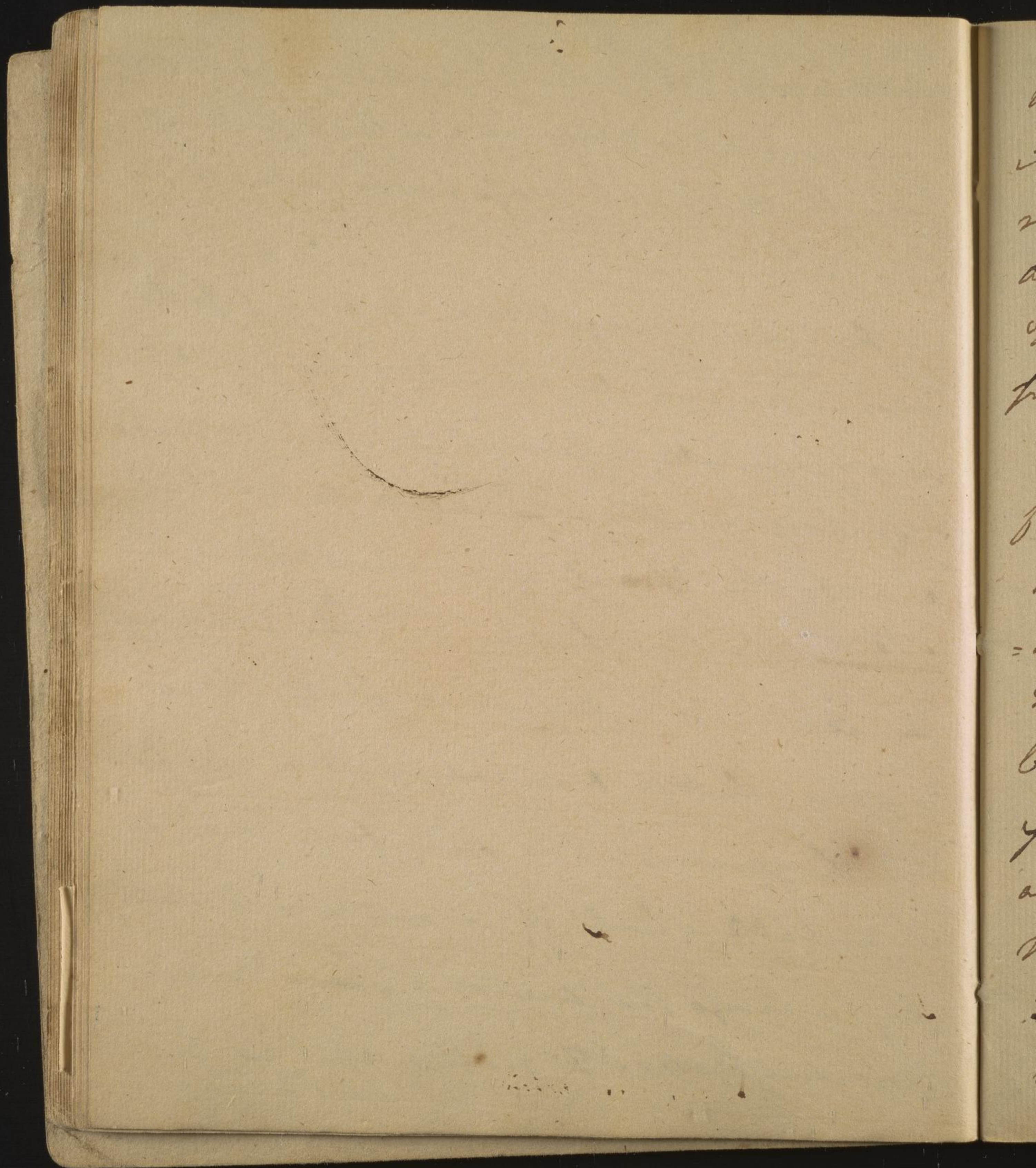
how many opinions ~~which~~ which
 I once believed and thought - I have reja-
 -cted in the course of the last ^{10 or 15} ~~20~~ years
 will not accuse me of obstinacy upon
 this subject. — My weakness in the
 republic of medicine is of a very ~~de~~
 opposite nature. It consists in a dispo-
 -sition to change ~~some of~~
~~disposable~~ ^{changing} my opinions. If this
 be a disorder in my mind, I ~~do~~ hope
 no remedy will ever be discovered to
 remove it - for ~~as~~ I conceive that ^{to be willing} for
 ever to unlearn, ~~instead of learning~~
^{is} ~~for ever~~ the ^{most certain & effectual} way to come to a
 knowledge of the truth. —

[By fermentation I mean that
 natural process by which ~~homogeneous~~ ^{heterogeneous}



matters are rendered homogeneous, so that a new product is obtained, wholly different from the original mass from which it was formed. —

Animal & vegetable — & even fossil substances are all capable of fermentation. — It is specifically different in each of those classes of matter. ^{when} In vegetable matters, they undergo the ~~process~~ of fermentation, they pass ^a thro' three stages — viz the vinous ^{an} acetic & putrefactive state. It is uncertain whether animal matters pass thro' the vinous, — tho' some facts make it probable, — but it is uncertain that they undergo the acetic ~~state~~ and putrefactive states. Dr Haller observes us



that he had distinctly perceived an acid smell
in meat, and Dr Thomas Smith ^{of Birmingham} informed
me that he distinctly perceived not only
an acid smell but an acid ^{taste} state in a piece
of beef which he had kept two days in
summer. —

Four ~~three~~ circumstances are necessary to
favour the fermentation I have described.

1 Heat from 72° to 112° are most favour-
able to it.

2 moisture: I fear tho' it affords the
basis of fermentation in all vegetables,
yet may be kept in a sound state for
an 100 years provided it be kept free from
moisture. — 3 Air.

4 Rest — This is necessary to render all
the stages of fermentation regular.
Motion ^{when immoderate} either prevents it altogether

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or hurried it over suddenly to the acetous
or putrefactive stages. —

The fermentation of all ^{substances} ~~acetic~~ ^{matters}
capable of it is quickened by certain sub-
stances called ferments.

Let us now inquire how far these
principles apply to the digestion of our
food.

1 Our Aliment consists of such sub-
stances as undergo the various acetous
& putrefactive stages of fermentation
out of the body. —

2 The heat of the Stomach is highly
favourable to the fermentation of
the Aliment when received into the
Stomach. (3) Our Aliment & Saliva are
both strongly impreg^d with Air.

4 The Aliment Impreg^d from Saliva.

and digestion is favoured by it.

v Dr Harwood of Cambridge proved the Advantages of rest after eating by the following experiment. He gave two pointers a hearty meal of flesh.

One rested - the other ran two hours after eating. In the former all the food was digested - in the other - it

was scarcely begun.

The state of the
Air influences Digestion. The inha.

^ - bilants of the ~~caravans~~ ^{ch} ~~caravans~~ of Switzer.

= land digest the ~~grossest~~ ^{grossest} Aliments ~~which~~ ^{which} upon their mountains which ~~are so viscid and gross that they can~~

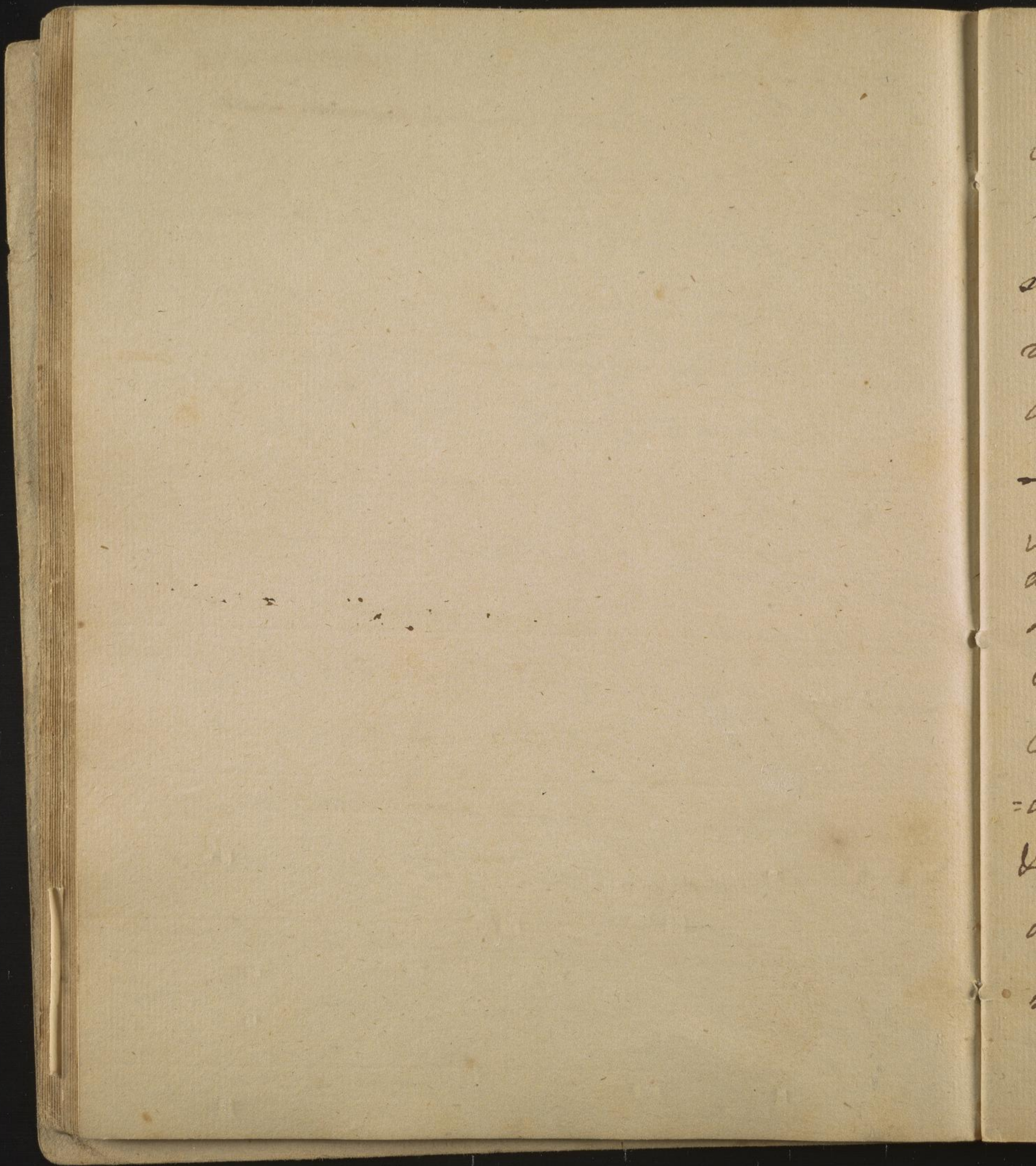
- not digest them upon their plains.
return go to p 648 v

- gastric juice - and the liquids, ~~with~~ ^{with} the
with our meals, ~~sufficient~~ ^{sufficient} all that
degree of moisture which is amply suffi-
-ent to promote its fermentation.

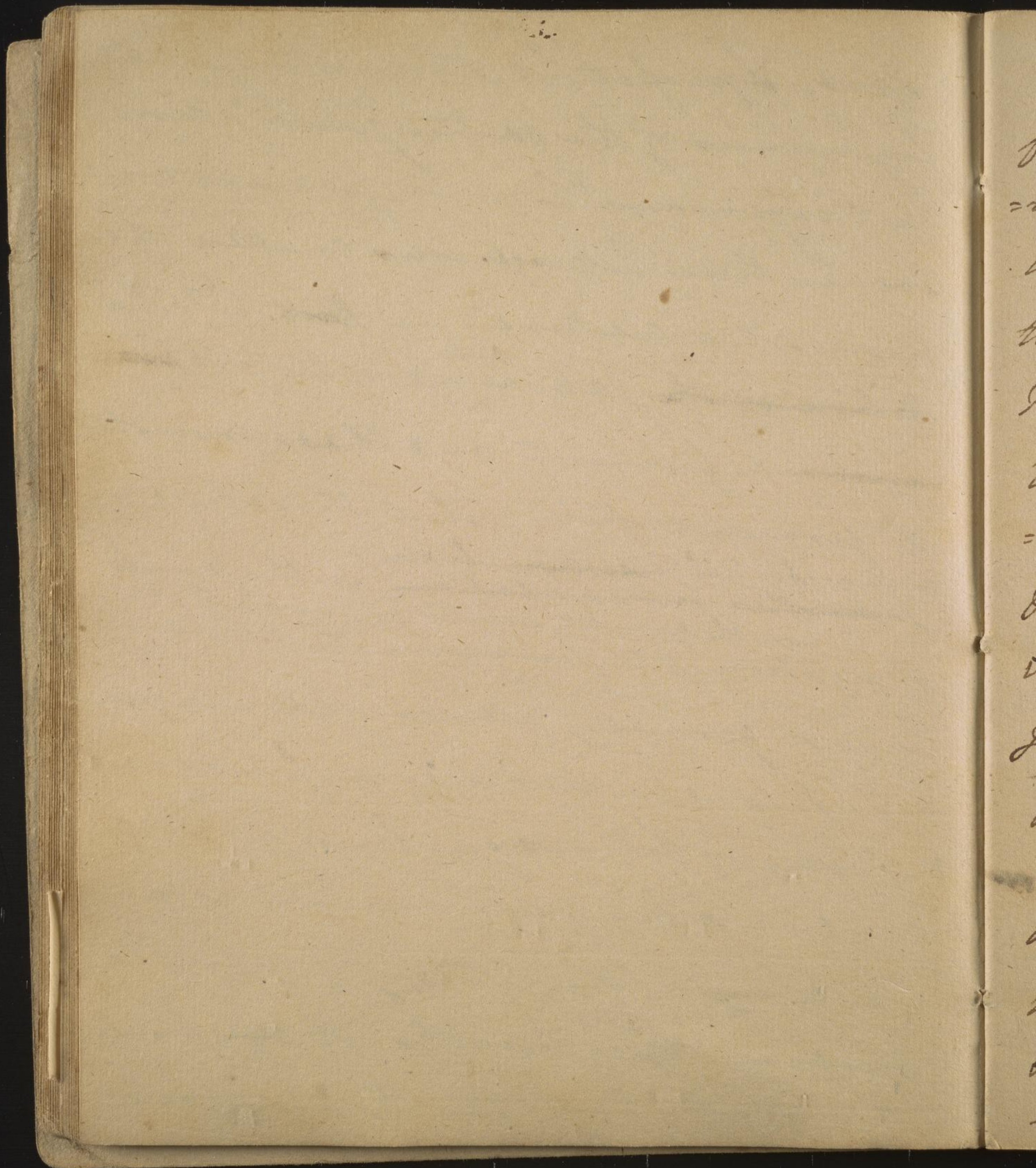
3 Digestion is always best promoted by
moderate ^{when greater than the} ~~exercise~~ ^{action} of water.
rest. - Motion ^{impairs} it if ~~void~~ ^{void} increased.

After eating a hearty meal. - V

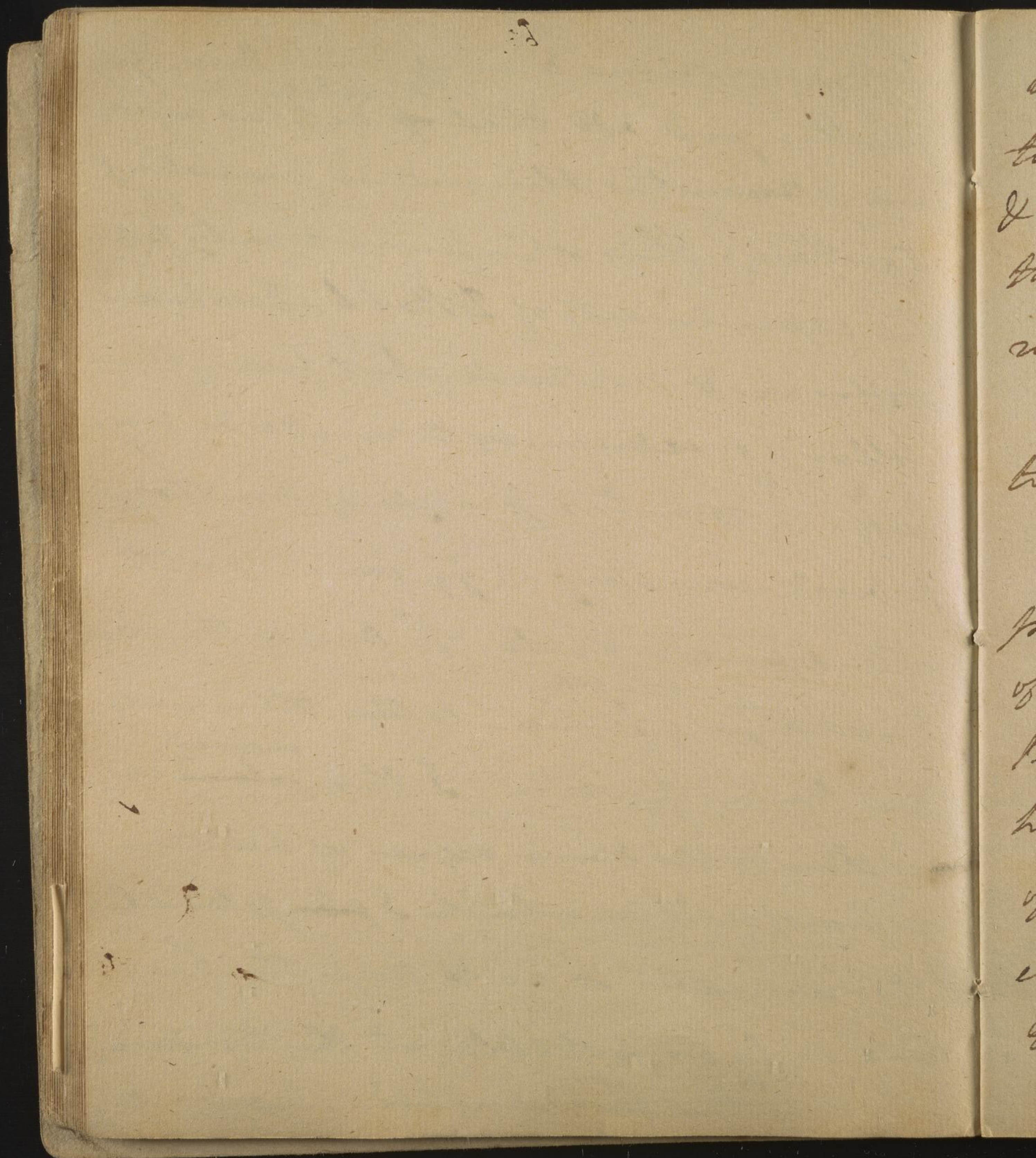
But it may be said that the rapidity
with which digestion is conducted in
the stomach is too great for the slow
process of fermentation - tho' favoured by
all the circumstances which have been
mentioned. I should ~~say~~ ^{concur} in this
objection ~~did~~ ^{not} ~~there~~ ^{two} things
which are calculated to accelerate
it beyond its ordinary term of duration
out of the body. These are 1st 12



Speedy & perfect solution in the stomach
 by means of the gastric juice - now,
 heterogeneous liquids, ferment much
 sooner than heterogeneous matters of a
 more solid nature. — ~~Part 2nd~~ The
~~action of the saliva~~ ^{acts} upon the food ~~as~~
~~as~~ a ferment and thus promotes
 its fermentation. That the saliva is
 a very essential ~~digestion~~ liquor
~~promotes fermentation~~ in the process
 of digestion I infer from the waste of it.
 1 from the quantity secreted 3×4 in a day ^{2nd}
 being so generally attended with indigesti-
 on. This is evident in great smokers
 & chewers of tobacco — some years ago
 a certain fruit gum was used as a
 mastic by the nobility of Spain to
 perfume their breath. It ~~was~~ produced
 this effect, but it spread dyspepsia,



& Hypochondriasis among ^{the Saliva} them. But I go
 further, and add, that ~~it~~ acts as a fer-
 -ment ^{upon} the Aliment in promoting
 digestion. This I infer not only from
 the experiments of Dittbl, - Boerhaave -
 Hoffman - & Mc Bride, - but from the
 following experiment made by my-
 -self. I took two parcels of Mutton
 & bread - consisting of 3ij each & put them
 into separate Vials. To One of them
 I added 3j of ^{healthy} Saliva - to the other half
 an Ounce of water. I then ^{exposed} placed each
 of them to the same degree of heat in
 a box of sand in which I ~~had~~ placed a
 thermometer so as to keep the heat
 as nearly as possible at the tempera-
 -ture of the human body. In five



hours the mixture with the saliva began to ferment, - in seven it became sour & in twelve it became putrid, - while the mixture with the simple water remained unchanged for 20 hours.

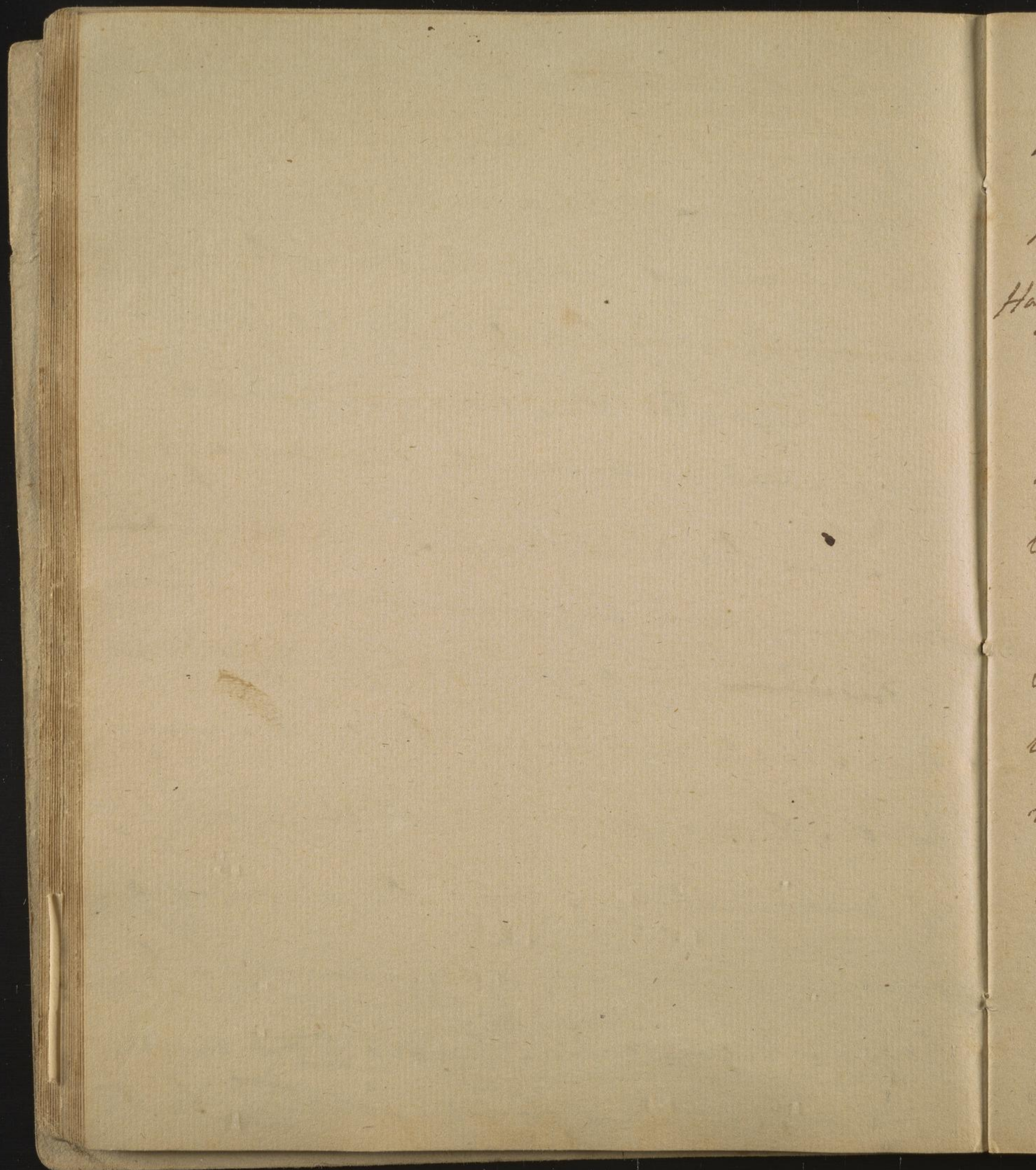
I repeated this experiment a 2nd time - and with exactly the same result.

Thus far Gent: have I mentioned ~~any~~ presumptive arguments only in favor of ^{fermentⁿ} ~~digestion~~ being essential to digestion.

But I shall not leave the controversy here. To decide it beyond all possibility

of contradiction, I tried the following experiments - not upon Man - Cows

Rabbits - Dogs - Cows - Horses For even upon Dr. Storer's Hypocistis, but



upon the ~~contents~~ of my own stomach,
at a time when I enjoyed the most
perfect health.

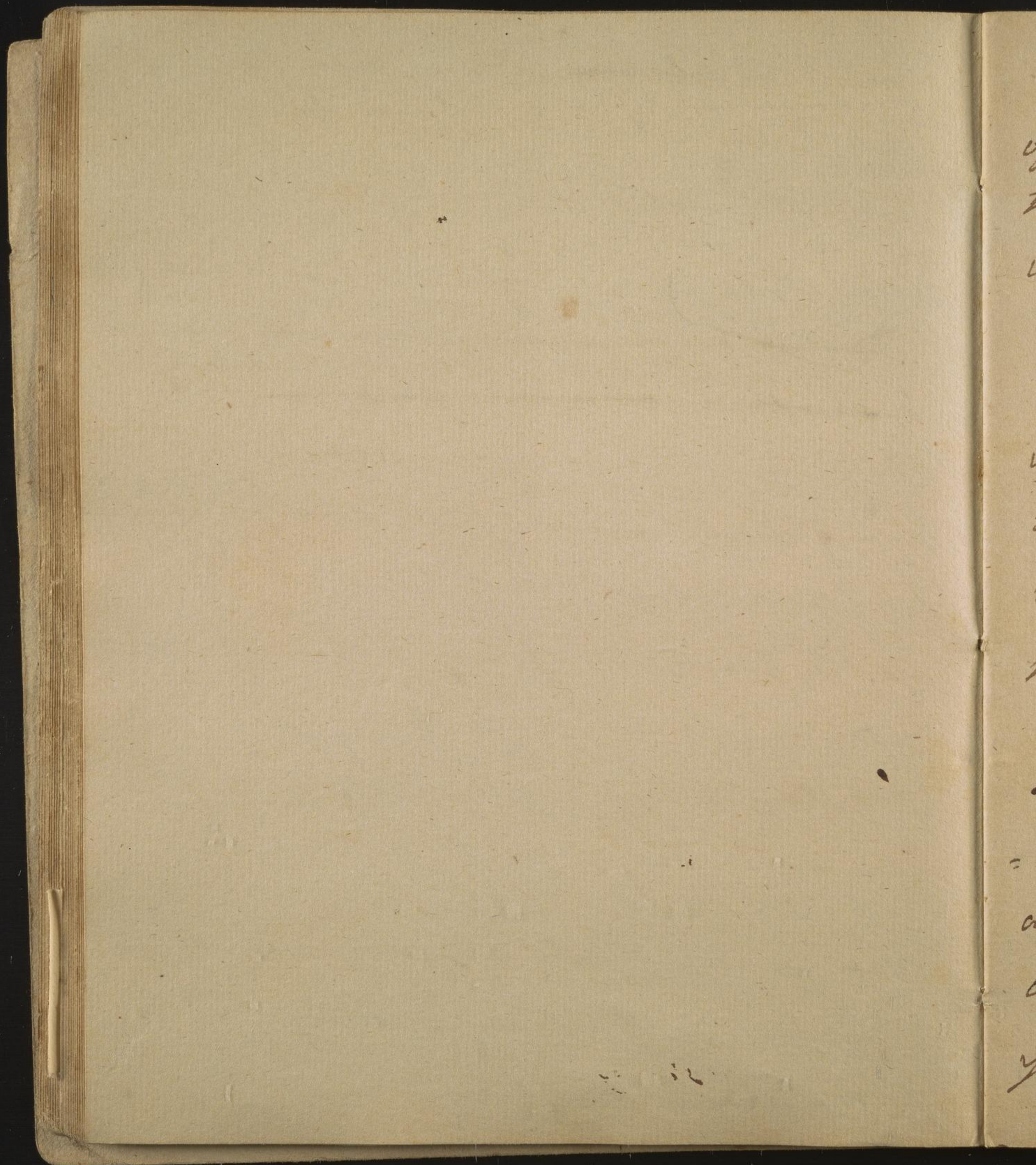
Exp^r 1

Having first taken a few grains of salt of Z in
order to destroy any remains of an acid in my
~~Having dined upon Beef-bread & pease~~
stomach after my last meal, I
~~drank small malt beer - three times~~

dined upon Beef-bread-pease & small
beer. Three hours afterwards I took
two grains of Tart. Emet. & threw
up the contents of my stomach. They
were acid to the taste, & imparted a
red color to an infusion of a blue
flower.

Exp^r 2

Having taken salt of Z as before, I
dined on meat-bread & pease, & drank
water only with them. Three hours



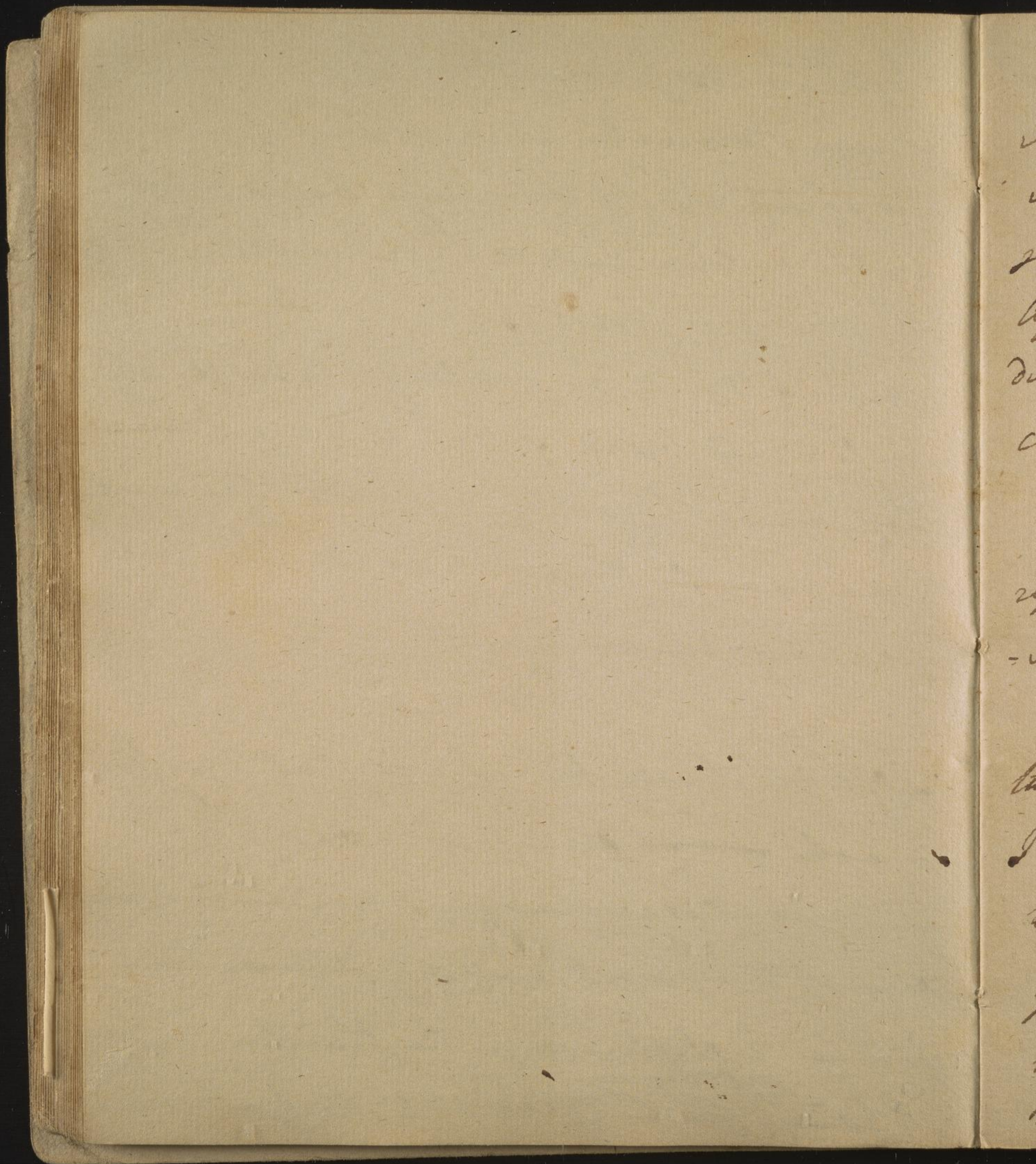
Afterwards I vomited. The contents of my Stomach were sour, & produced the same red color upon being mixed with a blue vegetab^{le} infusion.

Exp^t 3.

Having dined on poultry - Cabbage - and unleavened bread, I took a Vomit ~~three~~ ^{at} the usual hour afterwards. The vomit was exactly the same as in the two preceding experiments

Exp^t 4.

Lest it should be inferred, that my stomach ~~was~~ ^{was} ~~not~~ disordered - or possessed an acid dyscrasy - I prevailed upon one of the most healthy & ~~was~~ ^{was} ~~that~~ young Englishman in the University of Edin^{burgh}, ^{Dr. Penny} in the year 1767 to lend me



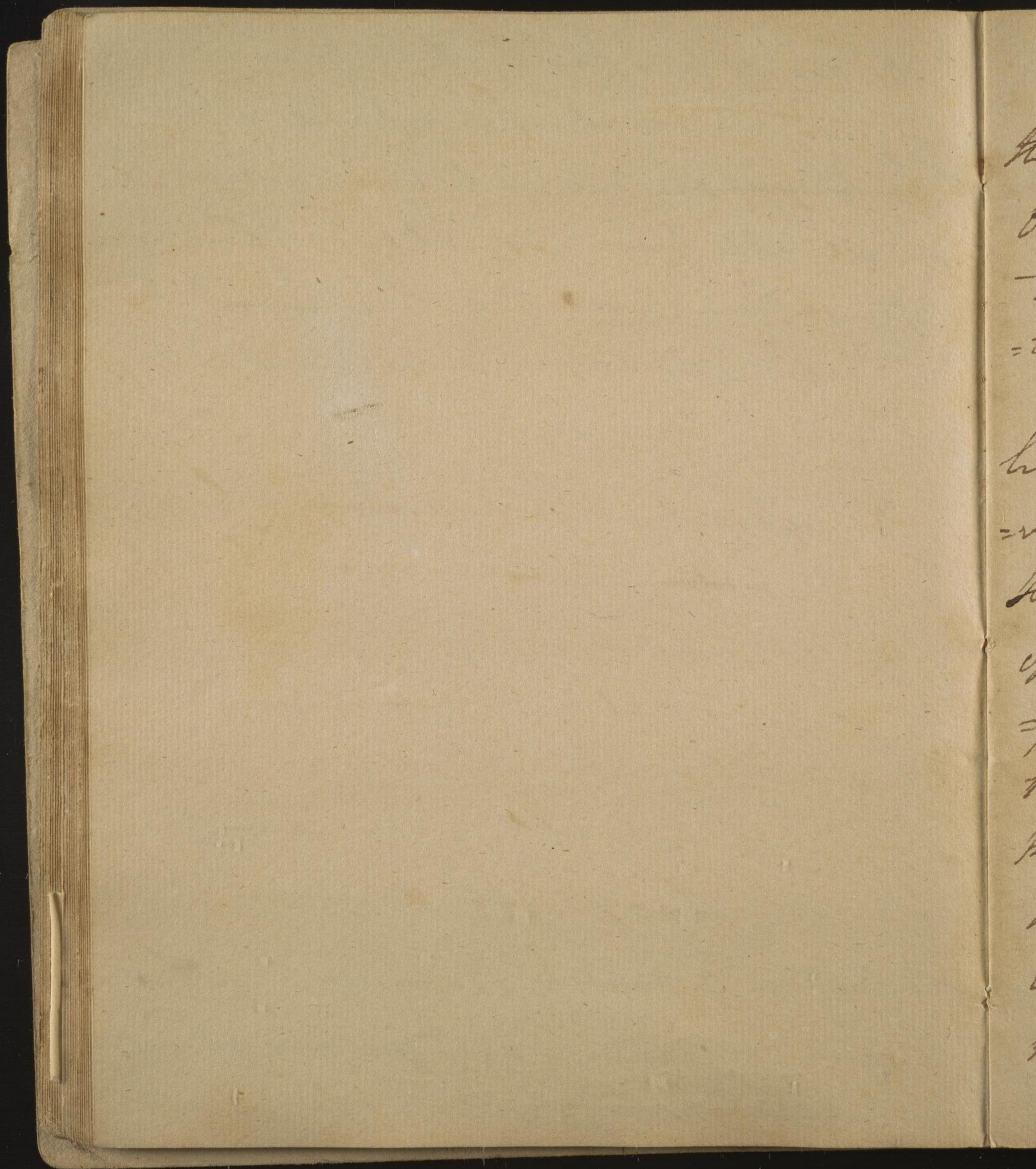
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the aid of his stomach in pursuing any
inquiries into this subject. He dined
~~with me~~ on duck - beans - & drank
small table beer with them. Thereupon
afterwards he vomited. The ~~was~~ liquor he
discharged was sour - & imparted a red
color to the blue vegetable infusion.

These experiments were ~~made~~ frequently
& repeated, ~~also~~ sometimes varied - but al-
ways with the same issue. —

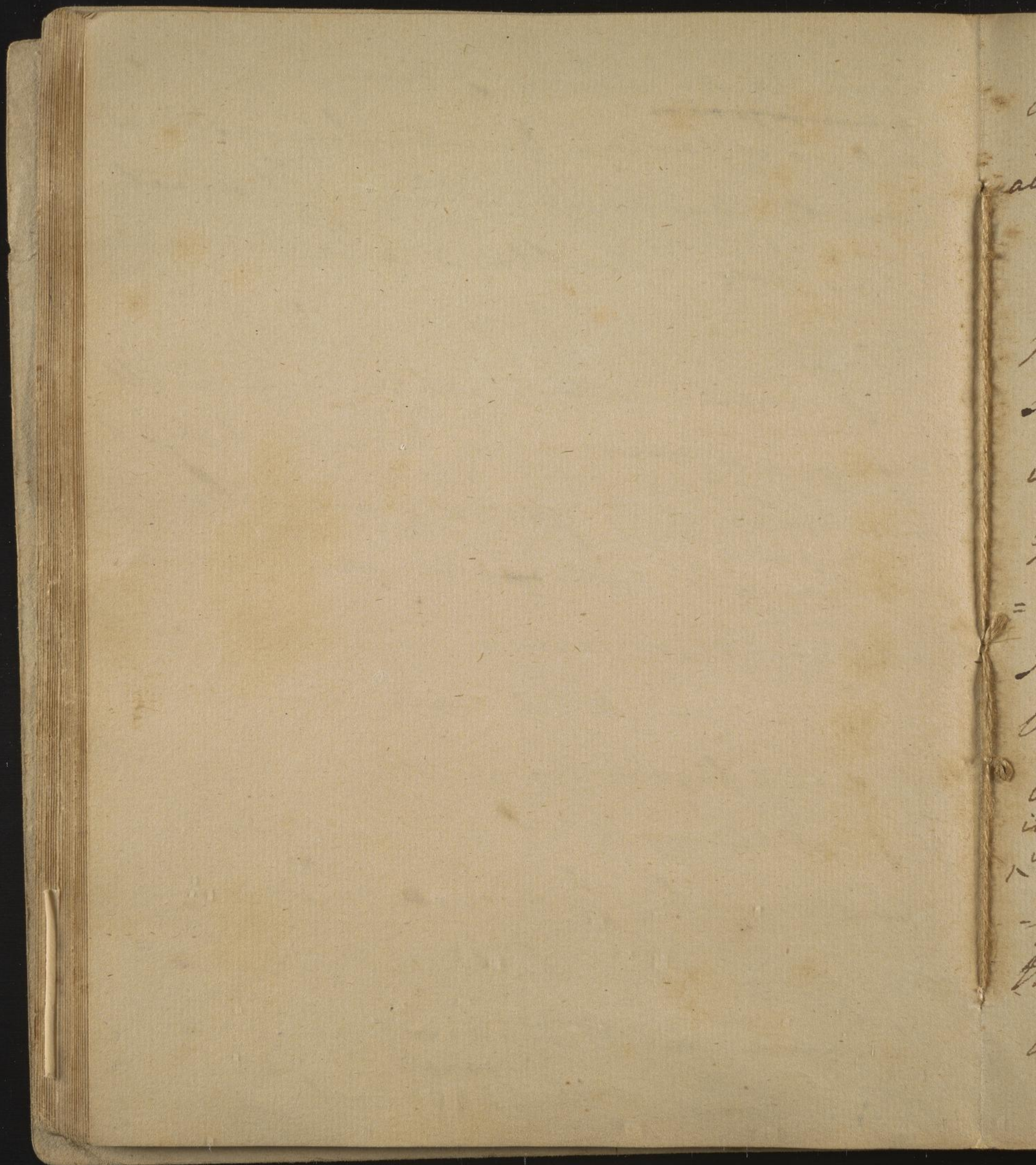
I know that great pains have been
taken to discredit them by a report that
I was not in health when ~~took~~ ^{I made} them.
but this is begging the question. viz.

Göppe a German Physician who
has lately written on digestion admits
my ^{being in health} ~~experiments~~, but ascribes the



acid liquor which I discharged to
 the ~~single~~ ^{single} ~~acid~~ ^{acid} of tartar Bimetic being separated
 from the Antimony in my stomach.
 - This ^{assertion} ~~idea~~ is too absurd to be contradic-
 -ted. —

I concur with Spalanzani in all
 he says in favor of the wonderful dissol-
 -ving power of the Gastric Juice - But
 solution ^{alone} will not ~~exchange~~ the nature
 of Aliment, or produce any new com-
 -pound, - much less will can it produce
 the same liquor from all the different
 kinds of Aliment which are taken in
 the Stomach. Is there a menstruum
 in Chemistry, - that produces exactly
 the same compound when mixed
 with every different metals - salts - & earths?



I ask the question again - is there
 any analogy to the gastric juice in
 all nature - if we allow it to possess ^{not} ~~but~~
 only a dissolving - but an assimilating
 power - over the most heterogeneous
 substances with which it is obliged to
 unite in the stomach. ^{I answer there is not.} - I beg pardon
 Gent: for this challenge - I now rec-
 = let one - and but one analogy to it -
 It is found, not in the book of Nature,
 but in ancient fable - it is the ^{hard} ~~stiff~~
 of eridas which turned every thing
 it touched into gold - And it differed only in per-
 -forming this change more suddenly,
 than the gastric juice converts our
 Aliment into Chyle.

I think it probable that the

✓ I conceive this Acid to be formed
unusually, and to serve very im-
portant purposes in the animal
Economy. —

+ In explaining particular functions
~~proceeds~~ ⁱⁿ ~~proceeds~~ ^{it} ~~go forward~~ ^{whole} in every part of the body,
the ~~functions of the body~~ — Otherwise we
shall make as great mistakes as Physi-
-ologists, as those Physicians make who
prescribe for Symptoms only in a disease
without regarding the state of the whole system.

Digestion in a healthy State always
 ceases as soon as an acid is evolved
 from the Aliment. ^{The} This acid ~~leaves~~ ^{which}
 we find in the Animal Salt, and
 afterwards becomes a basis of phos-
 phorus - ~~the acid~~ ^{appears to be formed} from it.
~~It is the~~ ^{Absence of this acid} ~~probably~~
 which produces the fermy, & its ferro-
 minance which forms the nucleus
 of the stone. It exists in a material
 only - and not in a formal State
 after it leaves the stomach, for it is
^{covered} ~~covered~~ after it is changed into Chyle
 so as to not to be ^{discerned} ~~perceptible~~ by
 the common tests of acids. ^{Discovered}

[Thus have I delivered my opinion
 upon the subject of digestion - nor shall
 I yield it to Spalanzani - Stevens -

V In ~~now~~ detailing the facts & exp^{ts} in
favor of fermentation taking place in
the stomach, I have not availed myself
of the least aid, from the air & acid humor
which are often discharged from the
stomach in digestion - for I consider them
when ~~orbid~~ phenomena, to be
explained ~~after~~, ~~when they~~ depending
upon a relaxation of the stomach, and
an excess in the fermentative process.

or Gorse ~~but~~ untill they have taken
 as many pukes as I have done, to
 establish the hypothesis they have
 given to the world. ~~7~~

✓ There is but one Exp^t wanting
 to ~~establish~~ ^{establish} the theory - & i.e. to ex-
 -amine by distillation whether the Con-
 -tents of the Stomach will yield by distil-
 -lation a Vinous Spirit. — If they should,
 it would place fermentation in the
 Stomach as ^{one of} the causes of digestion be-
 -yond all possibility of being doubted.]

I shall now add a few Observations
 upon the phenomena which go for-
 -ward in digestion. —

1 There is after every full meal
 a slight fever. It is sometimes ushered

Dr Prawl's exp^t which
underexposures² highly
probable. He died in 1802
with yellow fever before
he had completed his
exp^t.

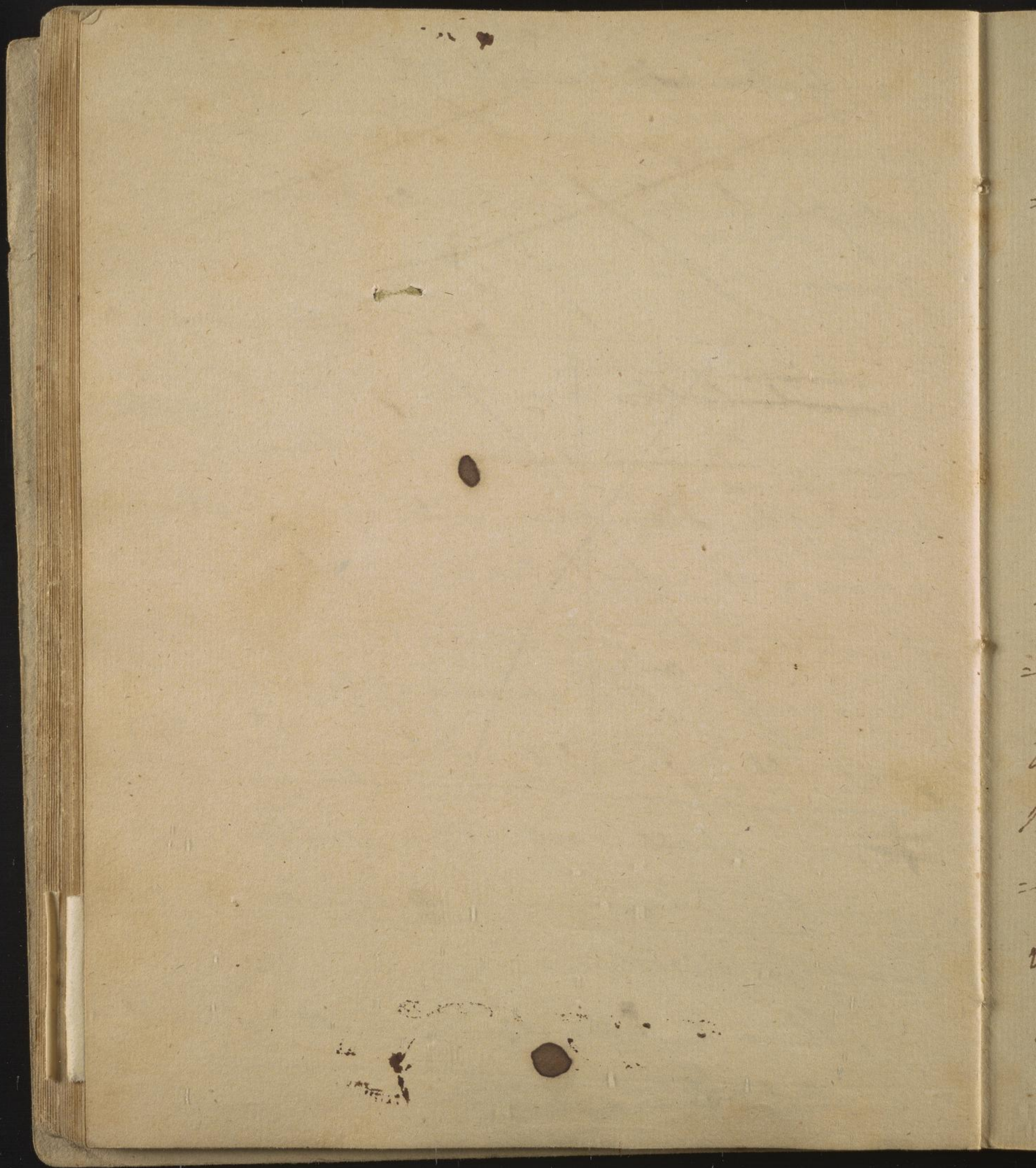
A Dog was killed his body opened and a thread tied round the Duodenum just below the pylorus, the duodenum and Aesophagus were then cut off & the stomach immediately taken out & nearly all the gastric juice poured out, it was then filled with Dough made of wheat flour & water & covered over in warm sand, & in which Fahrenheit's Thermometer stood at 96° with the divided end of the Aesophagus just above the surface of the sand, in this situation any change which might take place in the Dough would be easily observed, a piece of Dough was moistened with water & covered in the sand by the side of the stomach, by way of comparison - in two hours & three quarters a very active fermentation was observed in the stomach - the Dough worked up & run out of the Aesophagus - no change in the Dough in the sand

Experiment 2

A Cat was next killed & the stomach taken out as quick as possible to prevent it from cooking - the thread & other precautions to save the gastric juice was neglected & the stomach immediately covered in the sand & a lump of Dough about the size of a walnut put in the stomach & the same quantity put in a vial containing a small quantity of water - in one hour & twenty minutes there was a considerable motion in the stomach & the Dough worked up three fourths of an inch above the end of the Aesophagus - no change in the Dough in the phial

Experiment 3

Another Cat was killed & the stomach taken out this stomach contained a large quantity of gastric juice, a table spoon full of the gastric juice about two thirds of which was poured out into a phial - equal parts of Dough was put into the stomach & phial - the phial was used by way of comparison - in one hour & twenty ^{five} minutes the Dough in the stomach shew signs of fermentation the working increased & in 4 hours the fermentation was so considerable as to force $2\frac{1}{2}$ of the Dough out of the stomach - it was compared by a bystander to the working of a barrel of Cyder - the motion continued untill 6 hours at which time the sand was suffered to cool - not the least signs of change or motion appeared in the Dough in the phial



in with a slight degree of chillings,
and in weakly people it is often termi-
-nated with a gentle sweat. This fever
is occasioned by the stimulus of ~~food~~^{the}
meal being overproportioned to the
excitability of the system produced by
hunger. — It is not necessarily con-
-nected with eating — nor is it perceiv-
-ed after a slender meal. The know-
-ledge of however of the existence of this
fever, may be applied to several useful
purposes. — It should lead us to recom-
-mend a plentiful meal to all persons
who are about to be exposed to the
cold in ^{a situation in} ~~an exposed state~~ which they
cannot use ^{much} exercise ~~for~~ a small

✓ For the time is not yet come when
philosophy can aid either war, or
government. H

pamphlet which I published during
my attendance on the military hospitals
was entitled "Directions for the preserving
the health of soldiers" I recommended
in strong ~~terms~~ terms that a soldier
should never do the duty of a Centinel
in cold weather, but after a ^{hearty} ~~full~~
meal. But I am sorry to say that this advice
~~was not followed by the soldiers who were ordered~~
2 There is frequently a disposition to

Sleep after a full meal. This is owing
to the stimulus of the food producing
dyspnoea in the brain ^{fulnes &} coma, or the
~~is a state of insensibility~~ ^{insensibility} tending to the ~~sleeping~~
^{healthy} ~~state~~ ^{the} It is most commonly removed

by the additional stimulus of ~~food~~
tobacco in the form of snuff, or
sugar - or by a few glasses of wine.

2.2

This sleepiness is not necessarily connected with eating. It never ensued a moderate meal. Lewis Cornaro tells us that after he adopted ~~his~~ ^{the} new & temperate mode of living ^{wh} ~~it~~ restored his health, & prolonged his life to the most extreme old age, he found no disposition to sleep after eating.

3 The mental faculties are generally affected by a full meal. But this likewise does not follow a temperate repast. Lewis Cornaro used to ~~exchange~~ ^{exchange} his ~~table~~ ^{knives & fork} for a book, or his pen & ink, & never found any inconvenience from it after he began to live a life conformable

6
V. The food generally lies from 1 to 7 hours
in the stomach according as it is more or less
~~easy~~ easy of digestion. Its ^{time is from 3 to} ~~medium~~ ^{fine}
~~hours~~ ^{as it is animal or vegetable.} ~~hours~~ I shall hereafter mention
instances of ~~substances~~ substances lying
days - weeks - months & even years in the
stomach without being digested. p 2 649 =)

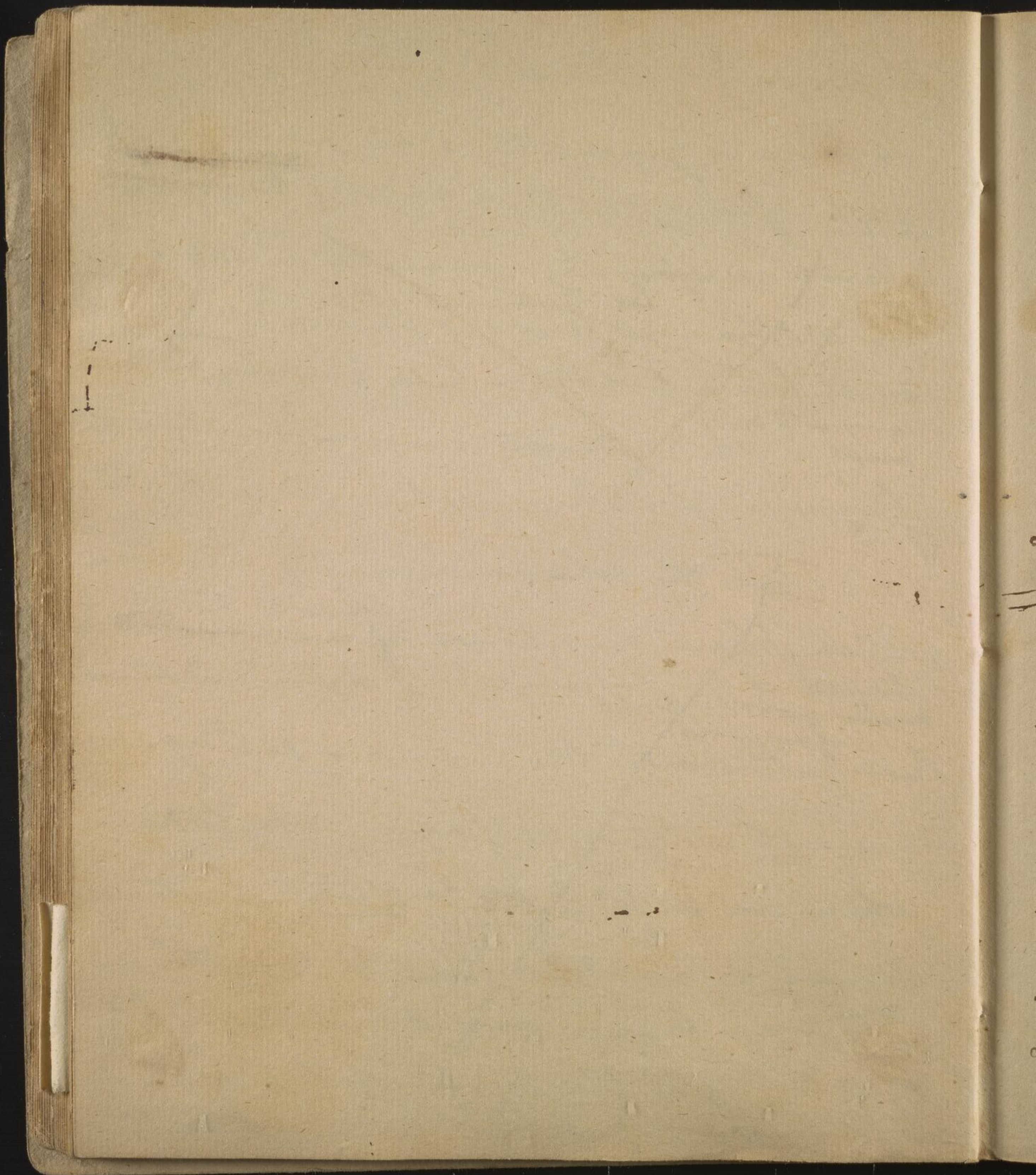
to reason & nature. —

4 There is generally a disposition ~~to rest~~ ~~after a plentiful meal~~, ~~rest~~

Dr Havers of Cambridge proved the
Advantages of rest ^{in favouring Digestion} by the following
experiment. He gave two pointers
a hearty meal of flesh. One rested;
— the other ran two hours after ea-
ting. He then killed them both. In
the former all the food was digested; in
the latter it was scarcely begun.

5 The State of the Air influences diges-
tion. The inhabitants of Switzerland
digest Aliments upon their moun-
tains which they cannot Digest in
their Valleys, nor upon their plains. ✓

may be present for a chronic



disease, without enjoying my patients
 to make six or seven small meals,
 instead of two or three large ones in
 a day. There are many instances
 of apoplexies & palsies following full
 meals in persons of delicate health,
 and some of sudden death from the
 same cause. I have said

= 17 The passions have a great influence
 upon the digestion of the food. It is invi-
 =gorated by cheerfulness & joy - hence we feel
 least inconvenience from full meals
 which are followed by cheerful con-
 =versation. ~~The passions have a great influence~~
 It is retarded by grief - fear - and
 shame - the passions seem to act
 only upon the muscular fibres of

✓ Is there ^{not} a preternatural affinity
of the electric fluid of the nerves
to the stomach which accelerates
the fermentative process, & thus im-
pairs the digestion? It seems probable
from an exp^t related by Dr Johnson.
If the 8th pair of nerves which goes to
the stomach be divided, digestion is
immediately interrupted, & the prod
ucts on the nature of gases in the
stomach.

✓ ~~you~~ some of you will perceive
that I have ~~changed~~ rejected fermentⁿ
from being one of the causes of the

of the Stomach. In the former Case the Stomach is assisted in propelling the Aliment After it is digested into the Pylorus; - in this ^{latter} Case, the debility of the Stomach induced by the relaxing Isapions prevents its acting with its usual force in throwing the food out of the Stomach.

The Aliment ~~after~~ ^{when} it is digested is called Chyme. After it passes into the Duodenum it is mixed with the bile. The cystic bile is said to ~~precipitate~~ ^{precipitates} its fecal parts from it, and imparts to them its peculiar Color. It is now called Chyle.

I have thus mentioned the means by which Chyle is formed by the Stomach, but it requires the Aid of another viscus to render it fit for

V off. certain excrementitious matters

In answer to the ^{first of these} opinions,

from the blood. ~~I have said~~

I shall only say the ⁱⁿ nature and in answer to

Chymus is not of acid ~~or of any other~~

the second, I shall ~~now~~ lay before you

~~and the~~ ~~facts~~ ~~intended~~ ~~to~~ ~~prove~~ ~~that~~ ~~the~~ ~~liver~~ ~~serves~~ ~~a~~

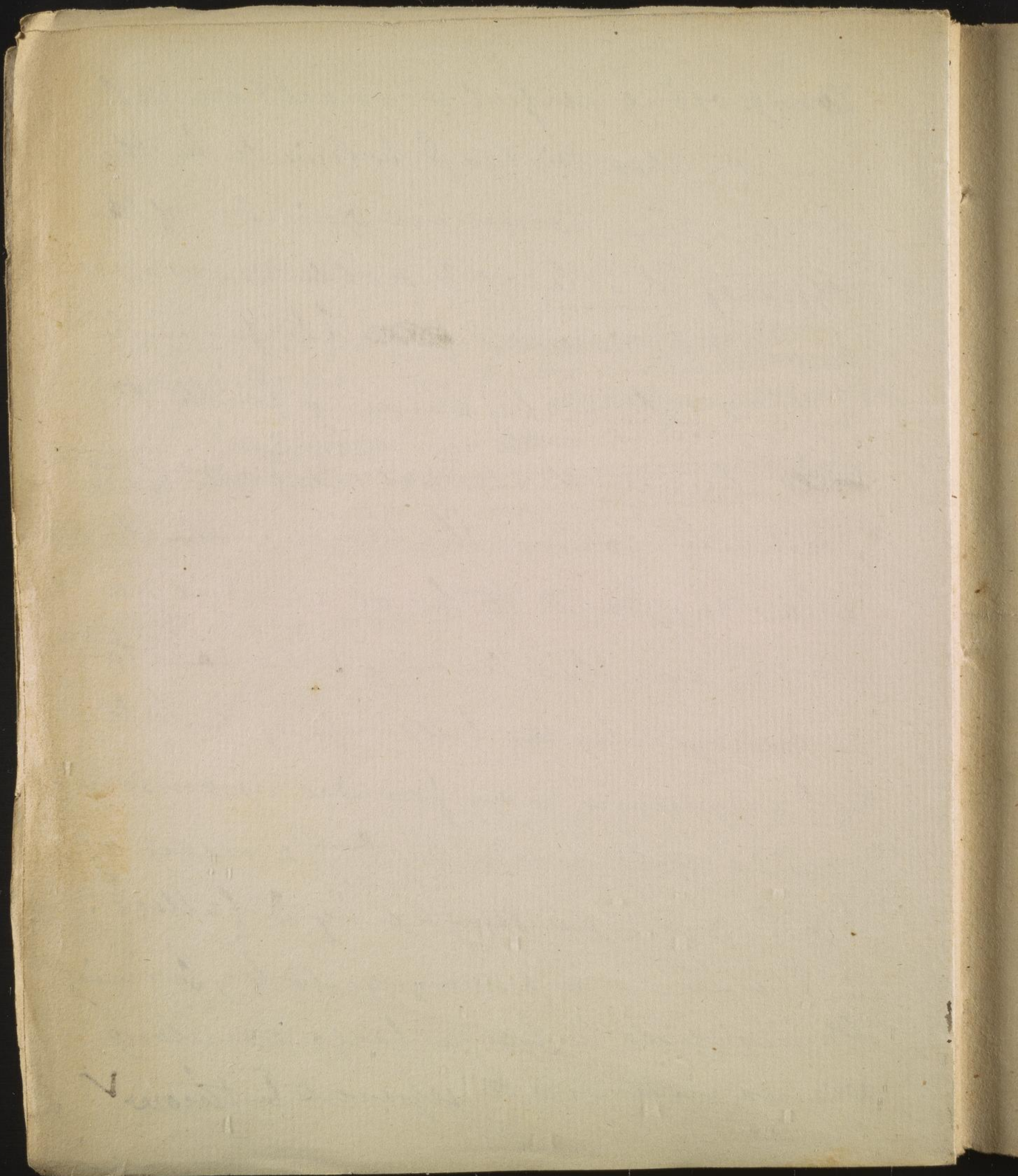
some facts intended to prove that the liver serves a

much higher purpose than to discharge ~~any~~

~~any~~ any thing of a fecal nature

from the blood. go to account of the
liver p: 16.

composing perfect animal nourish-
-ment. This viscus I believe to be the
Liver. The common opinion of the
Office of this large & noble viscus is
that it is intended ~~for~~ to furnish
a fluid which by mixing with the
~~food~~ Chyme that descends from the
Stomach forms the Chyle. The Chyme
was supposed to be of an acid na-
-ture, and this acidity was said to
be destroyed by the bitterness of the bile.
This opinion was founded upon some
experiments made by Dr Ramsay of
Edin² and was taught by Dr Fuller.
2 The Liver was supposed by some
Physiologists to be a large excretory
viscus intended to separate & throw^v

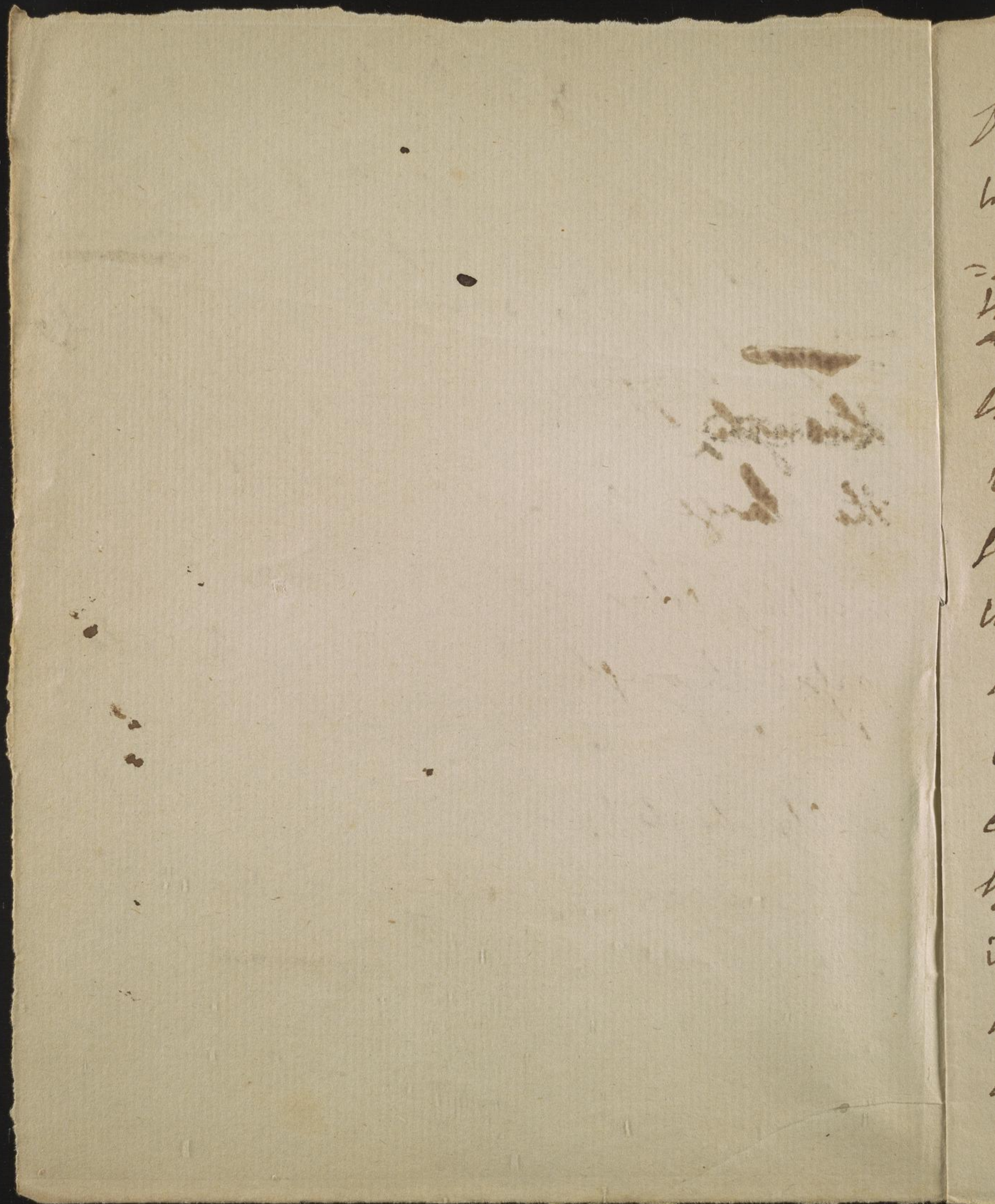


Of the Lymphatics or Absorbing System.

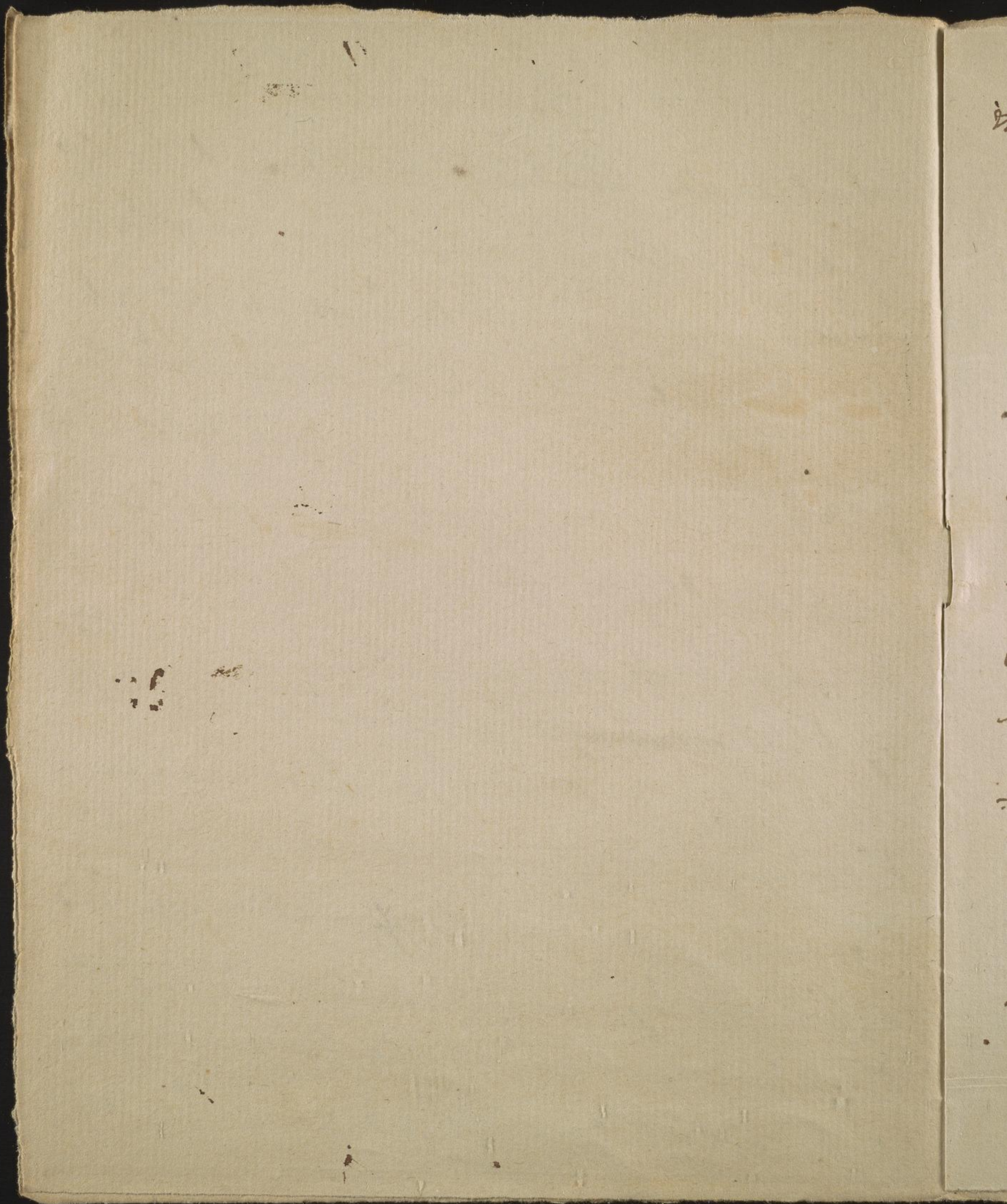
Upon this Subject you are not to expect a minute detail of all the Opinions & controversies which ~~have been~~ are to be found in books. ~~such a detail would be~~ ^{such a detail would be} as useless, as it would be tedious. I shall select only such facts ~~as appear to be true~~ as appear to be true, and deduce ~~from them~~ principles only, as ~~we~~ admit of being applied to pathology & the practice of Physic. —

§ By the Absorbing System is meant the Lactical as well as Lymphatic Vessels. They are alike in so many particulars ^{that} they have been designated by one name. They both open into cavities of the body — they have the same structure. ^{in both} they pass thro' ~~the same~~ glands in some cases,

We return to pursue the Chyle which when
formed by the stomach and liver ~~is~~
described is conveyed
by certain vessels distributed plentifully
through the small, and sparingly thro
the large guts called Lacteals from the
milky color of the Chyle ~~by~~ which
pass through them. These Lacteals
have been supposed to perform the office
of Absorbents by some Physiologists, while
Others suppose they perform the office of se-
cretory vessels, and that ^{they induce} ~~they induce~~ by their
action a change upon the Chyle analogous
to that which a gland imparts to the



fluids which enter into them. The Chyle
 whether admitted into the Lactals by ab-
 -sorption or secretion is conveyed by them
~~the~~ ~~into~~ ~~the~~ ~~lymphatic~~ into a large Canal called
 the Thoracic Duct which runs along the
 vertebrae, and is poured from it into the left
 subclavian Vein in which it is mixed
 with the blood, and conveyed to the heart.
 By what process it acquires all the properties
 of blood ~~is not~~ remains yet to be
 explained. Dr Hutchinson has thrown some
 light upon this mysterious subject in his
 ingenious inaugural dissertation. He has
 discovered by many experiments that the
 Chyle is coagulable in the thoracic duct,
 and after it enters the Arteries, but that



it parts off its coagulating ~~power~~ ^{quality in} the
 veins. From this you see it assumes
 one of the properties of the blood in the
 thoracic duct, and in the Arteries; but it
~~is~~ ^{is} deficient in others. It throws

~~no~~ — marks of what is called
 — vitality, or ~~what~~ ^{what} I have
 called animation of the coagulable
 lymph of the blood, when subjected to gal-
 -vanic influence. The Doctor supposes
 further, that the blood like the bones
 and muscles possesses a power of cover-
 -ing the matters which are brought
 into contact with it into its own
texture, and hence he says the Cause of

your friend
~~and~~

My dear friend
I have just received
your letter of the 10th
and am very glad to hear
from you. I am well and
hope this finds you the same.
I have not much news to write
at present. I am still in the
same place and doing the same
work. I am very busy at
times but always find time
to write to my friends.
I am very affectionately
yours
John

1844

Sanctification.

The force when precipitated from the
 Chyle pass slowly into the Lungs &c.
 These are capacious, in order to
~~prevent the~~ ~~confusion of~~ ~~the~~
~~discharge~~ insensibilities of our frequently
 discharging them. In old age they
 stagnate for many days without
 much injury to the system: on the
 contrary, they probably perform the
 offices of those Stimuli which have
^{to} ceased act, or have become feeble in
 old people, and thus help to keep up
 the actions and machinery of life.
 The Stagnation of the force in ~~the~~

✓ The Intestines of Carnivorous
animals are much shorter in
proportion to the length of their bodies
than in granivorous ~~animals.~~

~~For example they are as short as~~

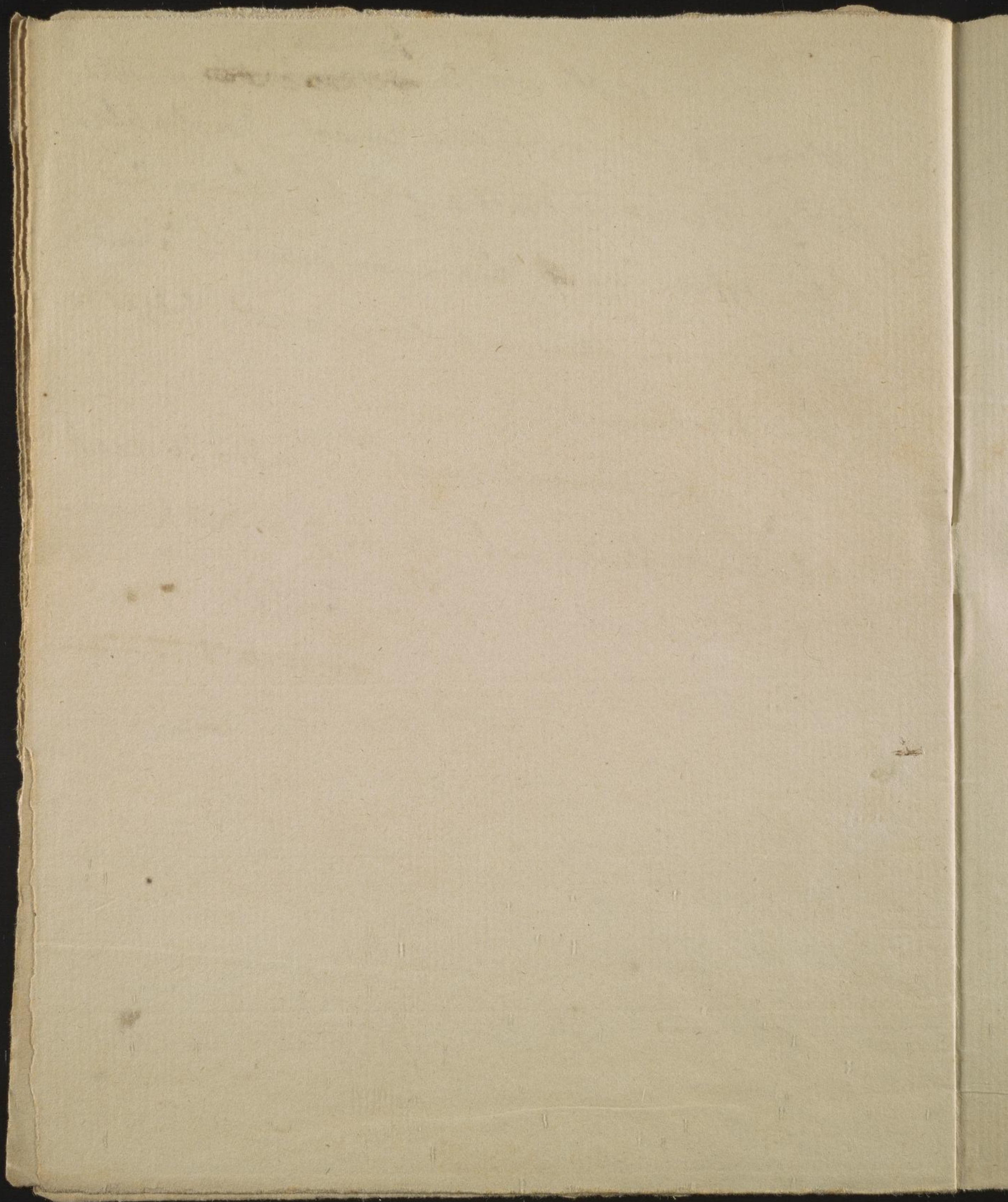
~~in the former & as long in the latter~~

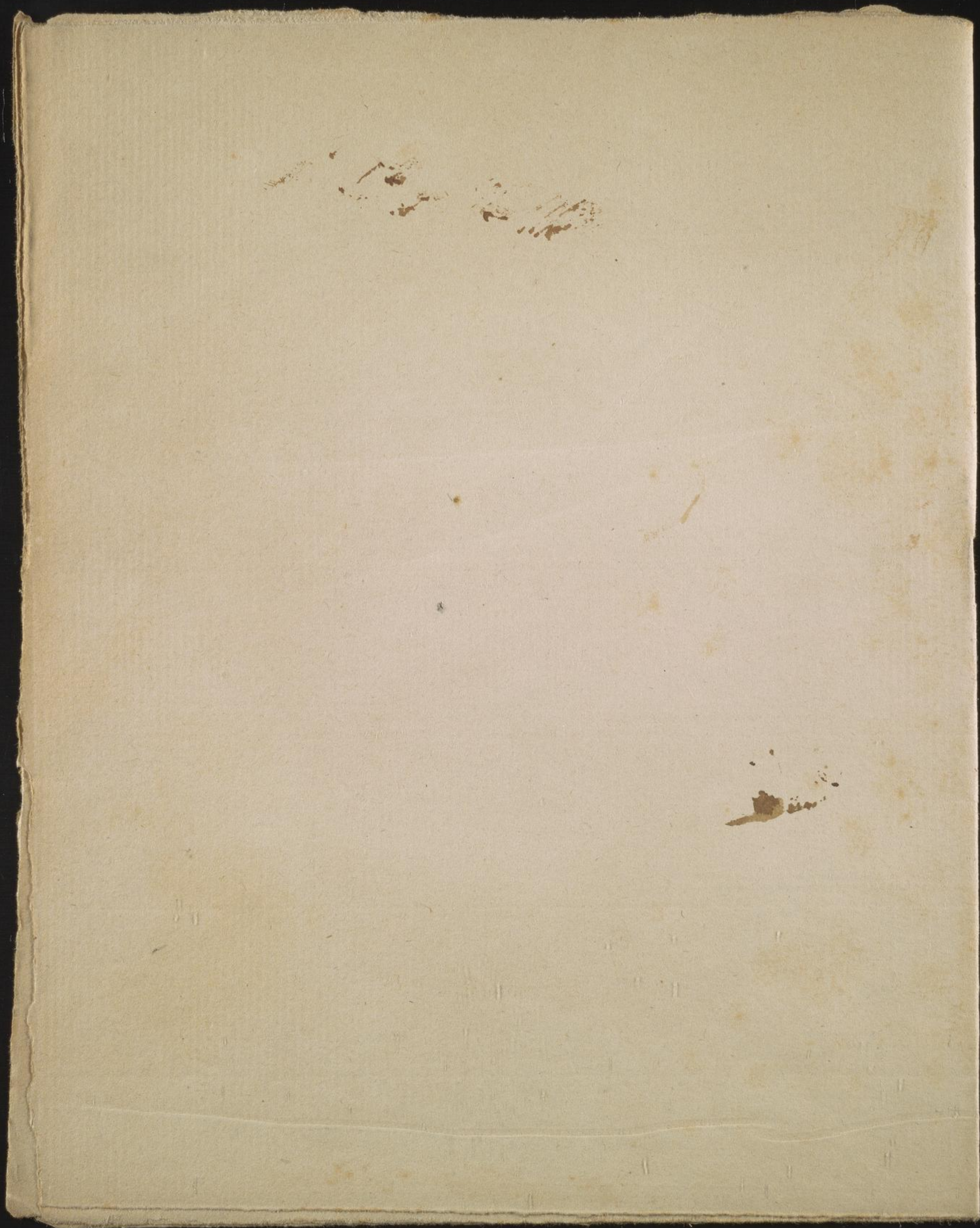
^{and} for obvious reasons. Vegetables
afford their nourishment more slowly
& ~~with~~ with more difficulty than
animal matters, hence they require
more mastication - longer digestion from
one or more stomachs & a longer
course of lactals to absorb the chyle
formed by vegetable food.

the bowels of old people ⁵ ~~is~~ ^{seems to be} ~~probably~~ in the
Colon, and hence the reason probably
why the wind discharged by them is
less offensive than in persons in
whom the feces are constantly lodged in
the Rectum. ✓

We proceed next in order to speak
of that fluid which is formed from
the Chyle, and that is Blood.

~~to p. 559-1~~





20
seldom^{so} offensive, as it is in childhood & middle
life. We should proceed next in order to

you will perceive that I have to have
no notice of the office of the Liver. It

trunk of the ^{blood} Lymphatics; but before we take
leave of the contents of the functions of the

viscera, there remains one, upon the
use of which Physiologists have been divided

or silent since the ~~peculiar~~ birth of our science.
I shall I mean the Spleen. I shall attempt to explain
its use by delivering ~~some~~ a few remarks upon it. ~~possess~~

V. Some of the Lymphatics do not
it has been supposed pour

these contents into the Thoracic Duct. ~~but~~
Dr. Brown has believes that this is the case
enter the blood vessels in other places. This
being the following experiment
has been proved by Dr. Brown by a simple

exp^t. - he tied up the thoracic duct in several

~~various~~ animals, and fed them up upon madder

ch² he found tinged their bones. It has been
Several other facts ~~favoring this~~ ^{opinion} fact related by
further established by ~~an experiment~~

Mr. Richardson ~~then~~ applied a small quantity
of Z Ointment to the ^{left} side of a young man.

Soon afterwards he observed the salivary
Glands ~~on~~ ^{tongue} One half the ~~glands~~ on

both have
 & pass by them in others & they ~~of the~~ ^{chiefly} fluids
 valves. — they differ in conveying ~~of~~
 of a different quality to the thoracic duct.

① Having ~~mentioned~~ ^{uses of} the lacteals formerly,
 it remains only to speak of the lymphatics
~~which are the same as the lacteals, & are~~
~~the same as the lacteals, & are~~
 They are a system of
 small vessels originating ~~from the~~
~~all the~~ ^{all the} cavities of the
 after frequently anastomosing, — enlarging
 body, which ~~pass the~~ ^{pass the} ~~different~~ ^{different}
 & contracting
 thro' a series of glands called Conglobate,
 & then
 discharge their contents into the ~~lacteal~~
 thoracic duct, which empty them into
 the ~~system~~ mass of blood in the manner
 formerly mentioned.

The following circumstances deserve
 Attention with respect to these vessels.

1 They appear to possess coats analogous

left side to be affected by it. The right side of
the mouth & tongue were wholly unaffected
by the ~~§~~ These facts are important, as they
show that certain medicines may be introduced +
moreover

✓ The fibres of these coats, possess great
irritability, - inasmuch that according
to Dr Waller ~~but~~ they disappear altogether
when they are stimulated, ~~and~~ even tho'
they be filled with their natural, or ^{the} w:
any artificial liquor. -

+ into the system without mixing w:
the blood, or entering the great circulation.
~~It is~~ It is thro the lymphatics only that
liquids pass to the kidneys from the stomach,
and hence the ^{rapidity} of their passage. A
Direct communication is not necessary
for that purpose. -

† In the course of the year 1808 I attended
a young Gent. ^{whose} who had laboured himself
for the disease. The ~~Dr~~ Dr Gelling & Co

to the coats of the blood vessels, One of which
 is ~~is said to be~~ ^{evidently} muscular. This appears
 1st from this alternate dilatation & contraction,
 and 2^{ly} from this being liable to pain -

& swelling & inflammation. These coats are
 much stronger in proportion to their size than the
 coats of the blood vessels. V

2 They are all endowed with valves placed
 in some cases at a small, in others at
 a large distance from each other, which
 prevent the reflux of the lymph, in the
 same manner ^{that} the Valves in the Veins
 prevent the reflux of the blood.

3 They are all endowed, not only with
 veins, but with Arteries & Vessels in which
 the circulation is carried on with the
 same regularity in the largest vessels of
 the body.

It has ^{the mouth of} ~~with certain~~
 been supposed that they ^{are} all endowed with
~~the analogy of the~~ ^{animals}

① Sores were on one side of his mouth only - and
the sores were healed on ~~one~~ ^{that} side only of
his penis by the application of $\frac{1}{2}$ to them. #
+ matters until they have first been dissolved
by a liquor ~~first~~ secreted by the arteries.

In Dec^r 1811 I attended a gentleman from
New Jersey, Judge Bergen in a palsy, ^{who} had been
salivated by his physician, ^{and in bygone} the $\frac{1}{2}$ affected the
paralytic side of his mouth only. I shall en-
-deavour presently to give a different explanation
of these facts in our pathology. — A

V6 They are said to possess a retrograde power
— by which means their contents are
propelled in a contrary direction to that
which is natural. ~~retrograde~~ Dr. Darwin
has furnished many facts in favor
of this ^{retrograde} motion in these vessels. & his father
has explained many of the phenomena
of diseases from it. see this work.

~~They possess~~ which has lately
mentioned a fact which shows that the
lymphatics ~~as~~ convey matters to remote
parts of the body, without

an opening which has been called a
mouth with which they not only absorb
liquids, but feed as it were upon solid
matters such as ~~the~~ blood - flesh, &
even bone. What makes it ^{still more} probable:
they possess ^{something like} mouths, is that they have
been demonstrated in several fish ~~Dr~~
Moussu supposes the lymphatics do not absorb these
5 The lymphatic glands appear from
filling them with ~~it~~ to be cellular, but
Dr Moussu has demonstrated that they are
~~composed~~ of convoluted vessels. Mr. Hewson
however thinks he discovered, a cellular
structure in some of the smallest glands.
It is certain that the blood vessels - nerves
& the small cells of the smallest glands are
connected together by cellular membranes.

Having delivered these general Observations,
we proceed next to inquire in
what manner the Lymph which is carried

A Upon Dr. Hovner's exp^t of the facts I have related I shall
~~In the mean while I shall only remark~~ ^{coloursing matter of the}
 that ~~Dr. Hovner~~ I believe that the ^{coloursing matter of the} madder ^{pen} ~~pen~~
^{penetrated} thro the solids of the body, and matter of the
~~as it does of the~~ in Dr. Hovner's
 exp^t and thus found its way into the general
 circulation by which it was conveyed to the
 bones. The same thing probably took place in
 the exp^t of Mr. Hovner upon a rabbit in
 which he tied up the ^{just before it entered at} ~~thoracic~~ ^{but} ~~at the~~
 junction between the left left jugular
 & subclavian Veins, and after waiting ^{some}
 injected ʒi of strong Infusion of Rhubarb,
 in 3/4 of an hour, the Urine was voided,
 & the presence of Rhubarb ^{was} detected in it
 by the addition of potash to it. It passed
 into the gall bladder in Mr. Hovner's 2^d
~~the~~ ~~off~~ ~~out~~ ~~was~~ ~~not~~ ~~the~~
 experiment in a dog in the same way.
 That the ~~affector~~ nothing can be

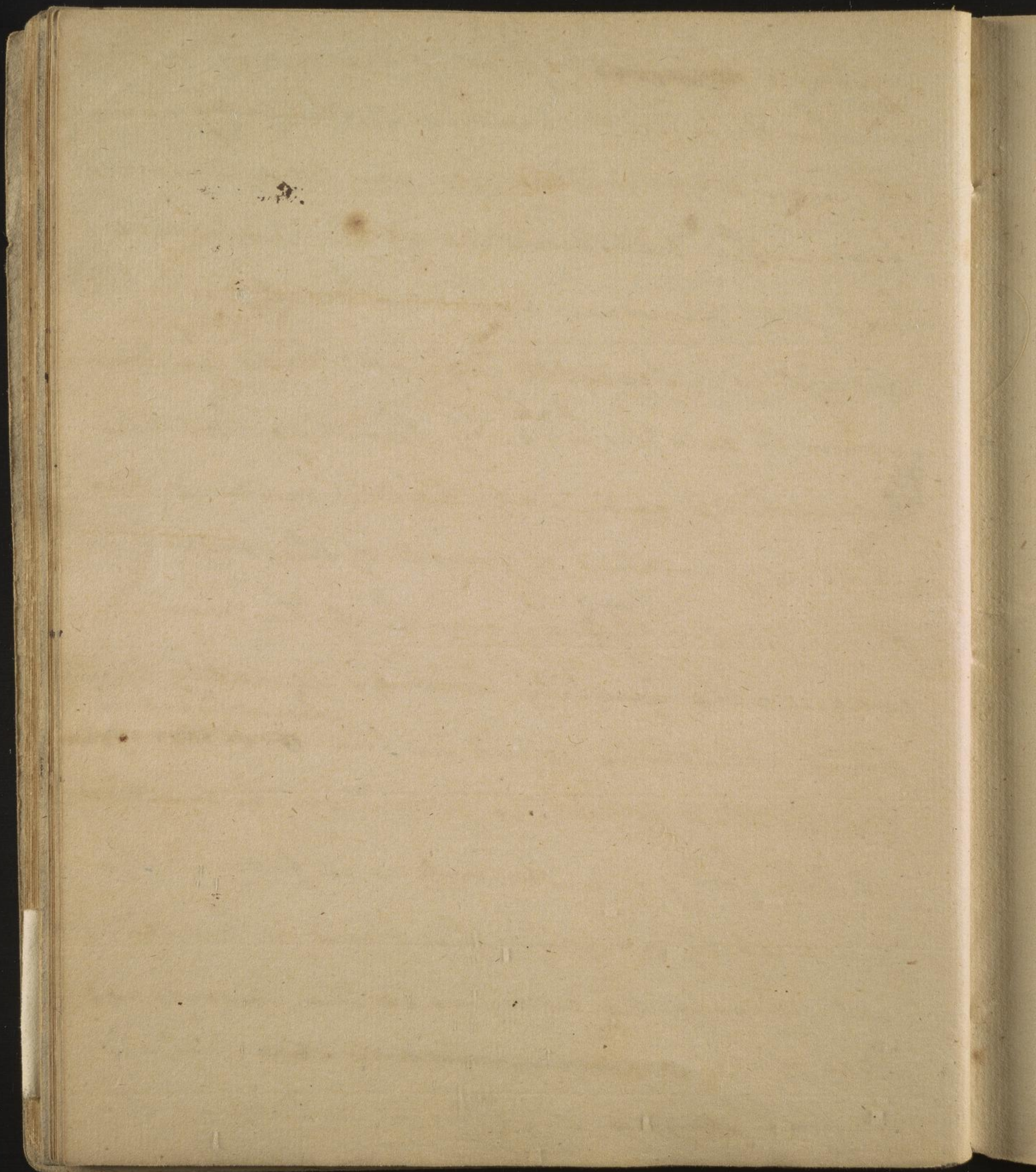
imposed in favor of Dr. Munnis opinion
from & affecting but ~~not~~ the Lymphatic

~~the comes the~~ my dear are ~~not~~ informing
Glands of one side only. I hope in our ^{part}
- thology to give a more satisfactory ^{explanat} ~~position~~
of these facts. I w^d only remark further,
~~you notice that I send to you a copy since~~ fore.

that I do not think that we require a passage
from the stomach to the kidneys to account
from the ^{sudden} rapid increase of Urine after the
stomach has ^{been} ^{an} overcharged with
watery liquors. It may be explained ⁱⁿ ^{this}
upon another principle to be mentioned
hereafter.

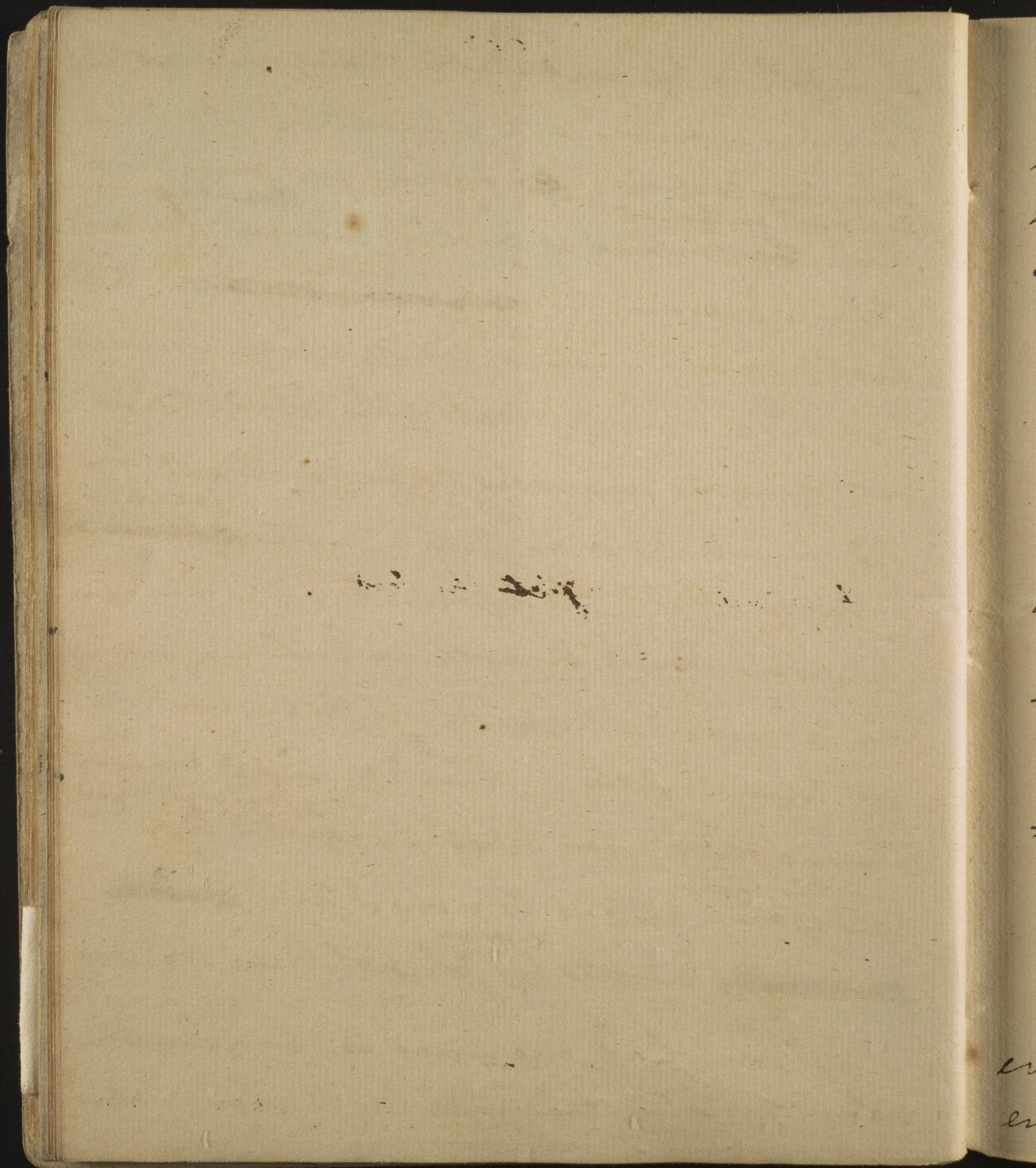
the intervention of the Rosacic duct. By
applying Gal Instrument to the ^{left} leg, ~~to the~~ ^{of the} ~~glands~~
young man, he affected the salivary ^{glands}
of the left side only, and one half the
left side of the ~~left side of the~~ ^{of} ~~tongue~~ with those Apthous sores
which attend a salivation - the right
side was wholly unaffected with the G.

by these ~~lymphatic~~ vessels to the heart is formed
 in the different cavities of the body. Formerly
 it was supposed to be an exudation
 from the extremities of the Arteries,
 but Mr Huxson has made it probable
 that it is a secreted liquor. This he endeav-
 ours to establish 1. by proving that the
 Lymph is of a coagulable nature, &
 that it partakes of most of the properties
 of the coagulable ^{ting} Lymph of the blood. This
 coagulable quality belongs equally to the
 fluid which is found in the ~~arteries~~ ^{lymph. vessels}
 with that which is found in the cavities
 of the body. 2 He infers it from the
 diseases to which this fluid is liable,
 all which he ascribes to the disordered
 state of the ~~arteries~~ ^{lymphatic} vessels
 which secrete it. & 3. In a Dropsy the



Lymph is less coagulable than in health.
 This he ascribes to a relaxation in the
 secretory vessels. ~~Again~~ Again. we sometimes
 find ~~the~~ ^{certain internal} surfaces of as the pleura ^{trachea} - Pericard:
 - Diaphragm & even the ~~interior~~ ^{inside} of the
 heart covered with a crust which resembles
 the rise or buffy coat of the blood. This
 Dr. Harrison supposes to be produced by
 too much tone or action in the ~~arteries~~ ^{vessels}
 which secrete the lymph - & lastly - he
 supposes this to be nothing but the product
 of a certain degree of inflammation
 in these vessels. - This opinion concern-
 -ing this was first suggested by Dr ^{my predecessor}
 Morgan, and it is now I find ~~many~~
~~many~~ adopted by many physiological writers.

In what manner is the lymph
 when secreted taken up by the lymphatics?



It has commonly been supposed by means of capillary attraction - hence the name of Absorbents - but I would rather suppose that it is by the effect of muscular contraction excited by the specific stimulus of the lymph ^{or matter taken up} upon the mouths of the Lymphatics. —

In what manner is the lymph when it enters the lymphatics conveyed to the ~~and throughout the body?~~ ^{thoracic duct?} I answer - 1 by the pulsation of adjoining Arteries - 2 by the pressure of contiguous muscles - and 3 by the stimulus of the lymph acting specifically & mechanically upon the lymphatic vessels in every part of their course.

Are lymphatic vessels found in every part of the body? I answer in every part except the head, and these

V 3^{ly} From the cures which have been
made of the Hydrocephalus internus,
which disquisitions prove to arise from
an effusion of water in the Ventricles
of the brain. — ~~ff~~

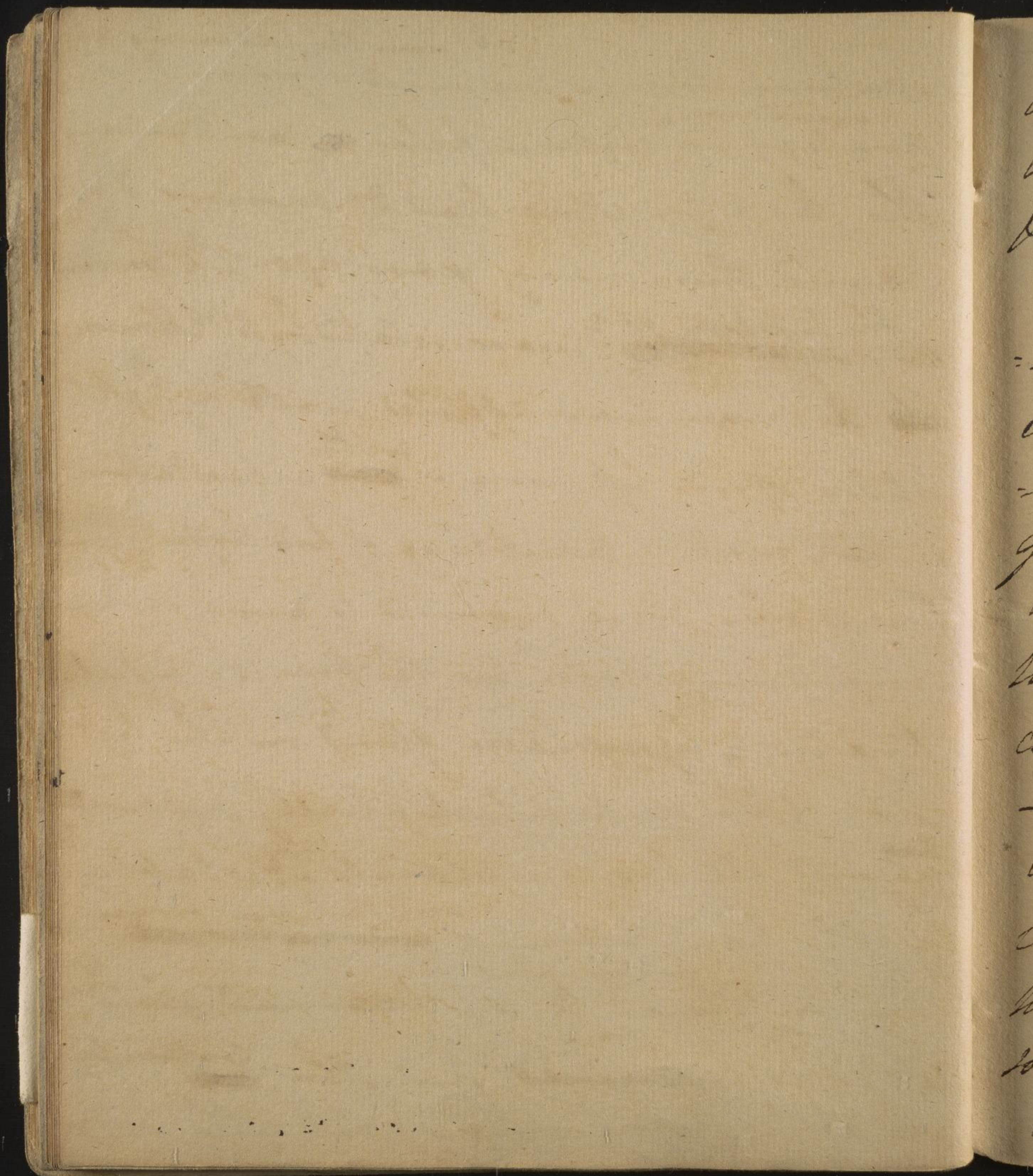
661 from the following cir:

existence there is presumed, from the
- circumstances.

Analogy in certain fishes ~~and~~ particularly
the skate in whose head De Meunier dis:

- covered them many years ago 2^d From
the history of a
~~the disease~~ disease related by Mr. Henson.

~~The~~ A man was affected with a right
palsy of his left arm - ~~and~~ with a hesitation
in ~~his~~ voice & a trembling of his lips. These
symptoms were supposed to arise from
some compression in the brain. A swell:
- ing in a lymphatic gland in the left
side of the neck which finally suppurated,
& removed all his complaints - Probably
by the translation of ^{an effusion from} ~~the internal~~
or cephalic
an internal to an external gland,
It is presumed from the ~~certainty~~
that the veins in no part of the body



absorb lymph. This has been proved
by many experiments made by Monro
& Hunter.

I have said that the lymphatics ab-
sorb solid as well as fluid bodies. This is
evident from many facts. The ~~destruction~~ destruc-
tion or annihilation of the Thyroid
gland can be accounted for in no other
way. The greater levity of the bones of old
than ^{of} young men, - the absorption of the
color imparted to the bones by madder, -
- the post-natal softness of the bones
in certain diseases, - & the detection of
bony matter in the Urine, all prove
that the lymphatics possess a power over
solid matters. - To these we may add the
occasional disappearance of schirous

✓ It would seem from this fact, that
the Arteries & Lymphatics perform
opposite offices in the System. The
business of the one, is to repair, - of the
Other to destroy different parts of the ~~system~~ ^{body} -
- of the one to secrete ~~of itself~~ ^{& effuse} a fluid,
& of the Other to absorb it & mix it again
with the blood from which it was secreted.
Health ^{seems to} consist in this strife between the
Sanguiferous & Lymphatic Systems, and
no longer ~~as they ^{do} an opposite task~~
~~place between them~~ ^{place between them} - than we
behold ~~in~~ Dropsy - Diabetes - Rickeys - and
Scrophula - of ^{which} more hereafter.

tumors & sores in every part of the body. They ^{appear to be} ~~are~~ removed only in consequence of the action of the lymphatics upon them.

Mr Hunter has remarked that in infancy the cavity of the thigh bone is remarkably small. As the child advances in age, this cavity becomes larger - Thus while the arteries add bony matter to the external, the lymphatics ~~consume~~ consume & absorb the internal part of the ~~bone~~ bone. In this manner - it is probable the ^{solids} ~~bone~~ are constantly undergoing a renovation in a greater or less degree, more especially in the early part of life. ✓

But we have not yet done with the offices of the lymphatics. They

the Lymphatics ~~absorb~~
I have said ~~absorption takes place~~
from internal parts of the body, but
it has long been ~~believed~~ that they
absorb likewise from the surface of the
body, and ~~was a long~~ ~~system of~~
many practical inductions in
pathology and the practice of physic
have been made from it. =

